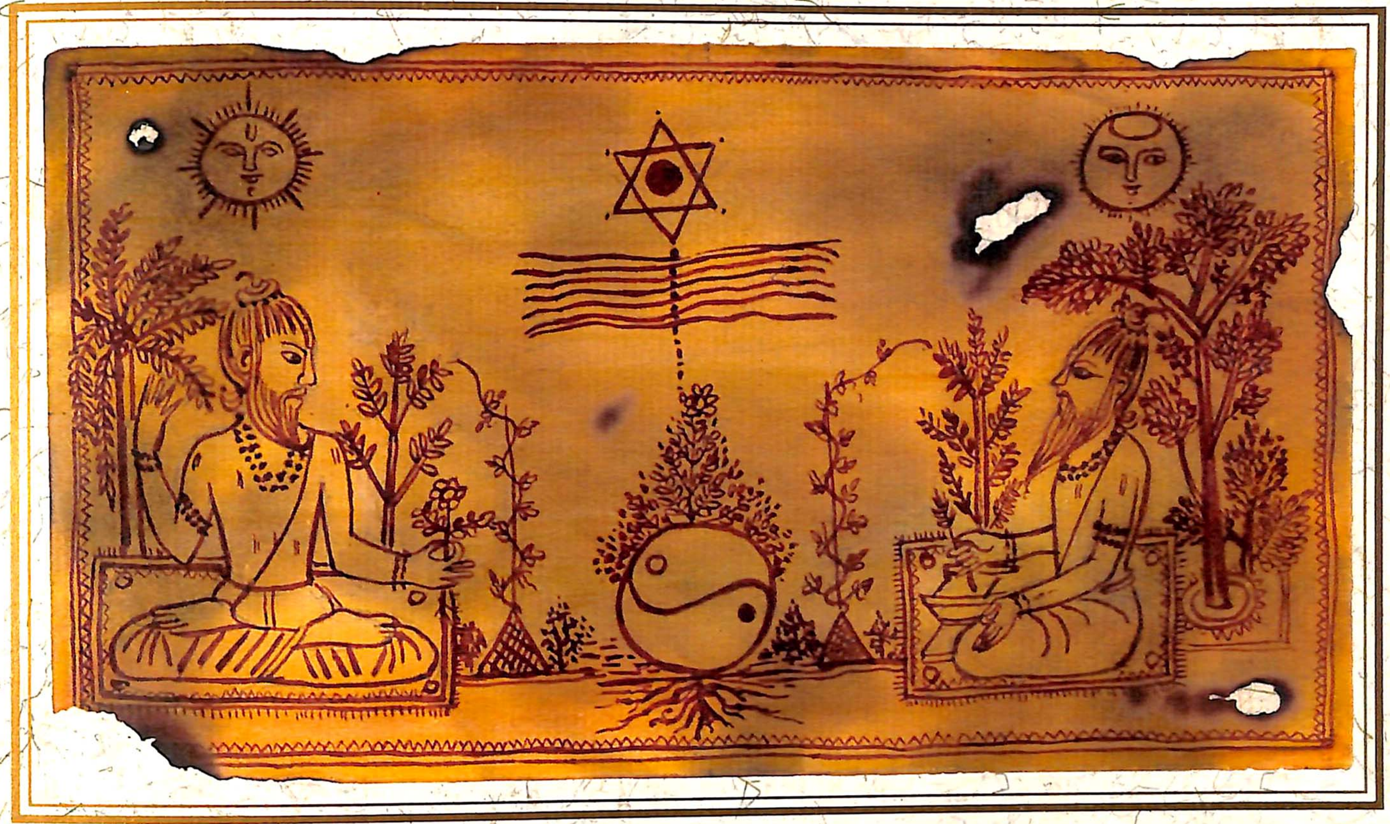
VRIKSHAYURVEDA

(The Science of Plant Life)



by

Surapala

Agri-History Bulletin No. 1

Asian Agri-History Foundation (AAHF)

Citation: Sadhale, Nalini (Tr.). 1996. Surapala's Vrikshayurveda (The Science of Plant Life by Surapala). Agri-History Bulletin No. 1. Asian Agri-History Foundation, Secunderabad 500 009, India.

One of the major activities of the Asian Agri-History Foundation (AAHF) is publishing translations of old manuscripts into English. This is the first publication in the bulletin series of AAHF. The original Sanskrit text of Surapala's Vrikshayurveda is followed by the excellent English translation of the text. Commentaries by three scientists on the biodiversity perspective, agronomic aspects, and ailments reveal the broad agricultural knowledge base that existed in India centuries ago. The AAHF is grateful to the Bodleian Library, Oxford, UK for providing the microfiche of the original Sanskrit manuscript of Surapala's Vrikshayurveda. The Foundation acknowledges the significant contributions made by S M Sinha, J J Abraham, Sheila Vijayakumar, and V S Reddy in designing, editing, and printing the bulletin.

Surapala's
VRIKSHAYURVEDA

(The Science of Plant Life by Surapala)

Translated
by
Nalini Sadhale

Commentaries
by
K L Mehra, S M Virmani, and Y L Nene

Agri-History Bulletin No. 1

सी. एस. आई. आर. / टी. के. डी. एल.
New Delhi
CSIR-TKDL

ASIAN AGRI-HISTORY FOUNDATION
1994
कृपिमित् कृषस्व

Asian Agri-History Foundation
47 ICRISAT Colony-I, Brig. Sayeed Road
Secunderabad 500 009, Andhra Pradesh, India

Asian Agri-History Foundation
47 ICRISAT Colony-I
Brig. Sayeed Road
Secunderabad 500 009
Andhra Pradesh
India

© Asian Agri-History Foundation 1996. All rights reserved. No part of this publication may be reproduced in any form or by any means, electronically, mechanically, by photocopying, recording or otherwise, without the prior permission of the copyright owners.

ISSN 0971-7722

Dedicated
to the memory of my husband
Late Shri Anand Sadhale
To Whom
Goodness was God
Rightness was Religion
Duty was Dogma
Work was Worship
And
Reading and Writing — a Ritual

— **Nalini Sadhale**

Contents

Preface	vii
Vrikshayurveda by Surapala (In Sanskrit)	1
Surapala's Vrikshayurveda (Translated by Nalini Sadhale)	33
Introduction	35
The Science of Plant Life	43
Notes	63
About the Translator	67
Bibliography	68
Commentaries	69
Biodiversity Perspective K L Mehra	71
Agronomic Aspects S M Virmani	75
Ailments Y L Nene	80
Plant Index	89

Preface

It is over two years now that Vrikshayurveda has kept me occupied. Although I was not continuously engaged in the work of translation in an active manner, it has never been long absent from my thoughts. Practical exigencies forced me to put aside the work again and again, sometimes for even two or three months at a stretch. These intervals, however, often proved fruitful either by getting a clue to acquiring a book on a related subject or getting important information on the subject through conversations with scholars and friends sharing my interest.

Generally, I have aimed at being faithful to the text of the manuscript. However, when due to some defective portions or lapses in the script, I was unable to comprehend the meaning, I have taken recourse to the texts and translations of Upavanavinoda or Brhatsamhita dealing with identical topics. Yet, I cannot say that I have invariably hit the true meaning. Repeated study in the past few months has often proved that there is room for improvement. It is a continuous process and I do not grieve for it since after the publication of the work, others too can participate in the process.

I am grateful to Dr Y L Nene for entrusting this work to me and putting up with all the delay in a patient manner. I deem it a great honor that the bulletin is being published at the inaugural function of the Asian Agri-History Foundation and express my gratitude to the members of the Trust.

I am grateful to Prof. Shri Ramachandrudu for his valuable suggestions in reading the manuscript. My thanks are due to Shri Ramachari Ghanapathi for making available to me his copies of Brhatsamhita and Upavanavinoda during the entire period of this translation. The well known ornithologist Shri Maruti Chittampalli discussed some important issues of the text with me and sent me a copy of Upavanavinoda for which I thank him profusely. Dr Dadegaonkar, a close family friend, had come to my rescue not only for making available to me the computer printouts of the manuscript but also for solving other practical difficulties which I faced during the period. I greatly value and appreciate his help. Dr Shakuntala Dave (Govt. Ayurveda College, Hyderabad) is like a member of my family and all the help she has rendered is beyond verbal thanks.

I shall be failing in my duty if I do not place on record the valuable help I have derived from the translations of Upavanavinoda—one by Majumdar (1935) in English and the other by Borkar in Marathi. Without these translations the work would have taken much longer time to be completed and would have to be published with some more blank spaces. The metrical composition provided many clues to the reading of defective or incomplete portions of Vrikshayurveda and the contents could be ascertained from these translations.

It is with a heavy heart that I lay down my pen. I have developed deeper associations with Vrikshayurveda which has helped me to forget the deep sorrow of my husband's sudden and sad demise and also to remember the happy days which we spent together in the company of Vrikshayurveda. I will consider my efforts amply rewarded if the agriculturists find it of some use.

Nalini Sadhale

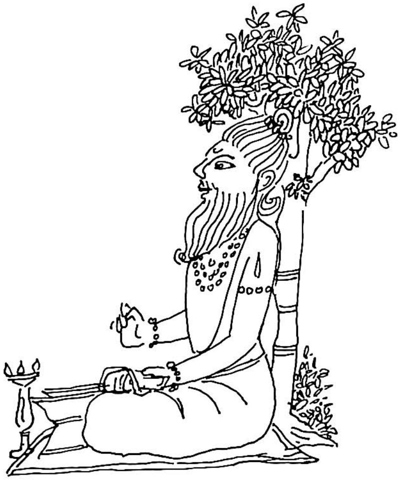
Hyderabad, India
31 May 1996

Vrikshayurveda by Surapala

(In Sanskrit)

VRIKSHAYURVEDA

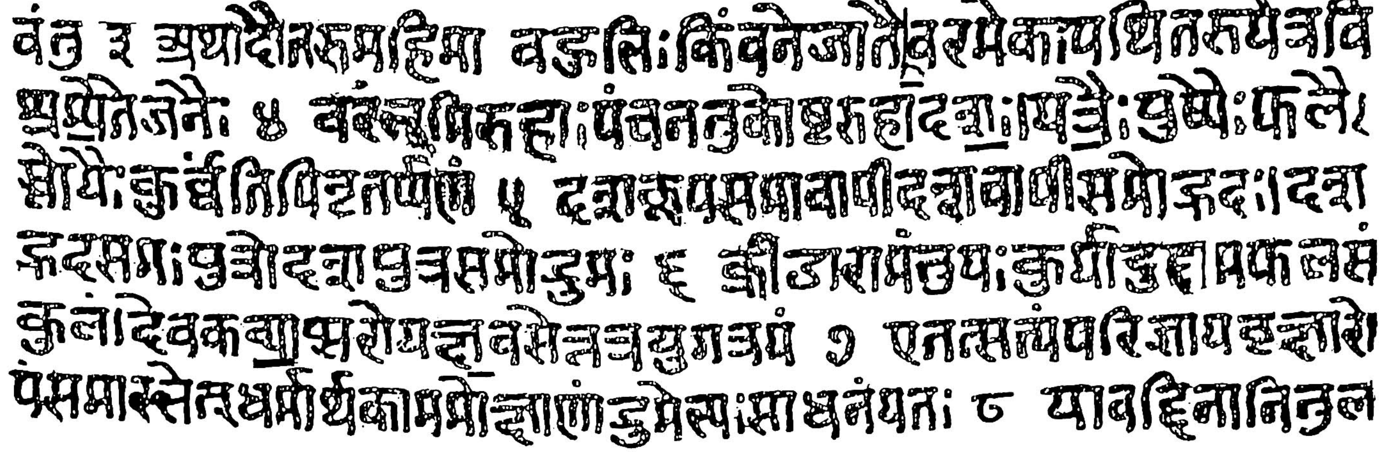
वृक्षायुर्वेद:



श्रीगणेशायनम:॥ ॥पुंसांसर्वसुखैकसाधनकंथा:सौदंर्यगर्वोद्धुरक्रीडालोलविला
1 सिनीजनमनस्फीतप्रमोदावहा:॥ गुंजद्भृंगविनिद्रपंकजसरस्फारोल्लसद्दीधिकायु
2 क्ता:संतिगृहेषुयस्यविपुलाराज्ञामसश्रीपति:॥ ॥नवंवयोहारिवधुसुरांगना:४
3,4 सखा:कलावित्कलवल्लकीस्वन:।वनानिसर्वंविफलंसुखेषिणोविनाविहा
5 रोपवनानितस्पते: २ शास्त्राणितावदवेलोक्यप्रयामुनीनामर्थ:सएवगादि १
6 त:परमात्म।एवंत्रिलोक्यालिखितंचविचारयंत:संत:सुखसावसरलभुदमाप्तु

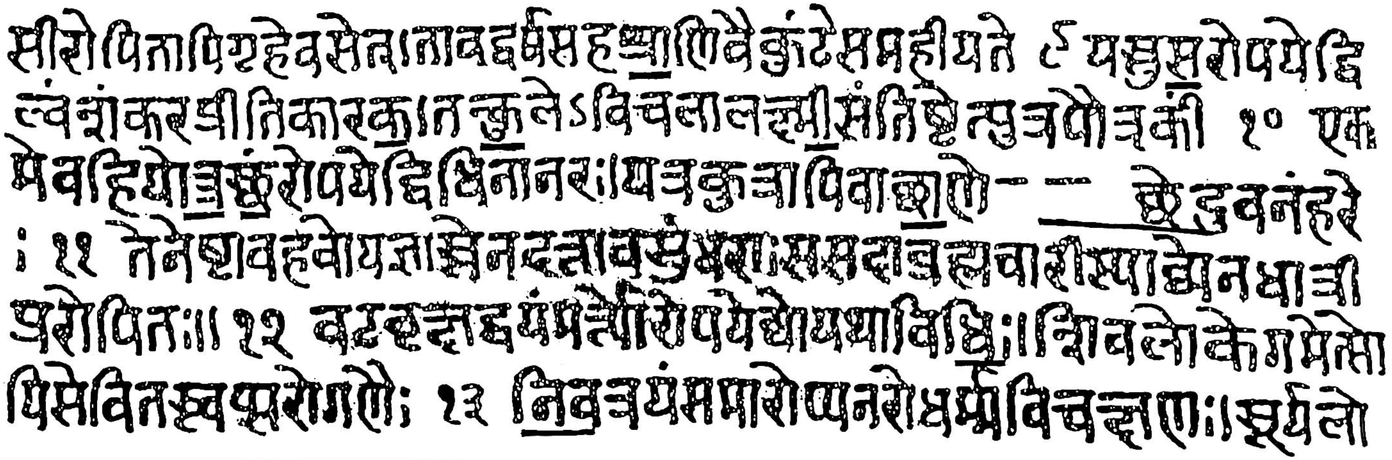
1. भृंग 2. र्वं 3. त् 4. षि 5. व 6. *completed as* परमात्मयुक्त्या

1; 2,3,4; 5,6



1. *completed as* जातैः पुत्रैर्धर्मार्थवर्जितैः।   2. म्य   3. श   4. त्र
5. व्य   6. क्षं

राम• २ — 1,2; 3,4; 6,7; 9; 10 — 5; 8 — राम २



1. स्रा   2. सं   3. कं   4. त्कु   5. क्षमीः   6. योऽश्वत्थं
7. स्था   8. *completed as* स गच्छेद्ध   9. धि   10. निंब

1 कंसमासाद्यवसेदब्दायुतत्रयं १४ चतुर्लक्षाहद्वाणांरोपणान्नात्रसंसयः।
2, 3 राजसूयस्यजज्ञस्यफलंप्राप्नोतिमानवः १५ पंचाम्रव्राखिणांयस्तंपःकुर्यात्स्व(
4,5,6,7 तिरोपणं।गारुडंलोकमासाद्यमोदतेदेववत्सदा १६ पञ्चाम्रान्नागखिनःसम्यरोप
8 येदेकमेववा।ब्रह्मलोकमवाप्नोतिमोदतेन्नापरैःसह १७ उदुंबरद्रुमानंषो
9, 10 रोपयेत्स्वयमेवयःपुलये।रोपणयापिवंइलोकेसमोदते १८ पार्वतीतोषि
11 तातेनमस्तवेदववनिरामयः।प्रजितादेवतासर्वेमप्रकोयेनरोपितः १९ स्त्रीशिणी

1. संशयः 2. शाखिणाम् 3. कु 4. *dropped* 5. मा 6. खि
7. नां 8. न 9. प्रे 10. र 11. र्वाः

२ 1,2 दाडिमीरंसापियालपनसाविलान्नातरूसंरोपयेद्दहुःखीजायतेसप्तजन्मसु २० अज्ञा
3,4 माज्ञानतोवापिजंहूयेनप्ररोपितः।गृहेपिसवसन्नित्यंपतिधर्मेणरज्यते २१ अश्वा
5,6 न्सर्वतरूरोप्यफलपुष्पोपयोगिनः।रत्नधेनुसहस्रस्यफलंप्राप्नोतिमानवः २२ अश्वत्था
7,8 मेकंपिचुमंदमेकंन्यग्रोधमेकंदशचिंचिणीकं।कपित्थविल्वामलकत्रयंचपंचाम्रवा(राम
पीनरकंनपश्येत।। २३ इतितरुमहिमा।।अथनिवासासन्नतरुशुभाशुभलक्षणा २
9,10,11,12 नि।।गृहस्यपूर्वदिग्भागेन्यग्रोधःसर्वकामिकः।उदुंबरश्चयाम्येवारुणेपिप्पलःशु

1. प्य 2. नो 3. बु 4. र्ये 5. स्र 6. त्थ 7. मं
8. 'चि' *added* 9. उ 10. दुं 11. ब 12. प्प

स्याः २४ प्लक्षश्चोत्तरतोवर्ज्योविपरीतांशुभवर्ज्जयेत्॥ २५ वर्ज्जयेत्पूर्वतोश्वत्थंप्लक्षं
दक्षिणतोगृहात्पश्चिमेचैवन्यग्रोधंतथोदुंवरमुत्तरे २६ देवदानवगंधर्वापिशाचोरग
1 राक्षसाः।पशुपक्षिमनुष्याश्चसंश्रयंतिसदातरून् २७ सर्वासांवृक्षजातीनांछायावर्ज्या
2,3 गृहेसदा।अपिसौवर्णिकंवृक्षंगृहद्वारेनरोपयेत् २८ वदरीकदलीचैवदाडिमीनीज
4 पूरकं।यत्रैतेहंतिगृहेयत्रतत्रहंनयत्रोहति २९ एरंडोकांचनारश्चतथाश्लेष्मातका
5,6 र्जुनः।करंजश्चैवत्पमीवृक्षाःनरापत्याःशुभिनोगृहे ३० आसन्नाःकंटकिनोरिपुभ

1\. ज्यी 2. त् 3. बी 4. कोड 5. रो 6. प्याः

1,2,3 ४ यदाःक्षीरिणोर्थनाशाय।कफिनःप्रजाक्षयदादारुण्यपिवर्जनंचेष्टं ३१ नीलीह
4,5,6 - रिद्रांचवनरःसदोप्त्वाच्छुभेधनैश्वक्षयमस्तुपैयात्।एतान्द्रुमसर्वाश्ववमेवजातांच्छिंद्या
7,8,9 दृषीणांववनाद्विधिज्ञः ३२ नकुर्युर्यात्यनेकृत्यामार्गेयेष्टुविक्रादिकां।अन्यथाक
10 लहोद्वेगौकष्टंवालातेकृते ३३ तस्माज्ञात्वाहिशुभसंदंप्तुत्रसंततिवर्द्धनं।पश्चिमोत्तर
पूर्वेषुसर्वेद्रुपवनंहितं ३४ इतिशुभाशुभलक्षणानि॥अथस्थलपिनिरूपणं॥ ४
11,12,13 जांगलानूपसामान्याश्चेसावापिचमेदिनी।सेदैःसासिध्यतेपुंस्त्रिवैर्लितोरसतस्तथा॥ 14

1\. फलि 2. जा 3. कराः 4. प्त्वा 5. नै 6. य
7\. *dropped* 8. ष्व 9. हि *inserted* 10. भ *inserted* 11. ष
12\. इ् *inserted* 13. भि 14. र्वं

1,2,3,4,5 ॥ ३५ असितविपांडुश्वेतरूपामललोहितसितपीततोविषः क्रमदो॥ मधुरोम्ललवण
6 तिक्तकटुककषायाश्चवोरसाः ३६ विषपाषाणवल्मीकबिलदुःषातथोषराः स्सरोद
काशार्करिकातस्योनहितामही ३७ इंद्रनीलसुकपत्रकोमलाशंखकुंदकुमुदें
7,8 दुसन्निभा॥तप्तकांचनविकाशिचंपकस्पर्द्धिनीवसुमतीप्रशस्यते ३८ समासमास
9 न्नजलाहरित्तरूतृणांकुरा॥तस्यांसर्वेयथास्थानंप्ररोहंतिमहीरुहाः ३९ नजांगला
10 नवानूपास्तुभिःसाधारणाःस्मृताः॥तस्यांसर्वेपितरवःप्ररोहंतिनसंशयः ४० पन

1. *dropped* 2. रो 3. चि 4. श: 5. रा 6. 'क' *inserted*
7. सि 8. प 9. ग 10. सं

1 सलकुचतालीवंशाजंबीरजंबूतिलकवटकदंबाम्रातखर्जूरपूगाः॥कदलितितिंशाम्रंह्मी
2,3 केतकीनालिकेरीप्लक्षतयइतिचान्येप्रायसोनूपजास्तु ४१ सोलांजनःश्रीफलसप्त
4,5 पर्णाःसेफालिकाशोफशामीकरीरा॥कर्कंधुकाकेसरनिंबशोकाश्चढिंलसंतेस्तुविजां
6,7 गलाद्या ४२ बीजपूरकपुंनागचंपकाम्रातिमुक्तकाः॥प्रियंगुदाडिमाद्याश्चसा
8 धारणसमुद्भवाः ४३ निषिद्धेवमहीपानांप्रसावांछतिपत्तनं॥असात्म्यत्त्वाभि
9 संपन्नाअपिसिद्धंतिपादपाः ४४ इतिस्त्वभिनिरूपणं॥वनस्पतिद्रुमलताःगुल्मा

1. गा: 2. शो 3. शो 4. शे 5. शा 6. प 7. का
8. च्छा 9. रू

1 ।पादपजातयः।बीजात्कांडात्तथाकंदाद्धपनंत्रिविधंमतं ४५ तेवनस्पतयःओस्मा
2, 3 विनापुष्पेःफलंतिये।द्रुमाश्चतेनिगदिताःपुष्पेःसहफलंतिये ४६ प्रसरंतिप्रता
4,5,6,7 नैर्याश्चालताःपरिकीर्तिताःवहुस्तंवाप्रविटपीश्रगुल्माःपरिकीर्तिताः ४७ जं
8,9,10 बूचंपकपुंनागतागकेशरचिंचिणी।कपित्थवदरीविल्वकुंसाकारीप्रियंगवः
11, 12 ४८ पनसाम्रमधूकाद्याःकरमर्द्दाधुवीजजाःतांवूलीसिंसिडुवारश्चतग
13 रौद्याःस्कंधकांडजाः ४९ पाटलादाडिमीप्लक्षकरवीरवटादयः।मल्लिकोडुंवराकुं

1.ते 2.श्च 3.ता 4.भा 5. *dropped* 6.पि
7.'न' *inserted* 8.बू 9.ना 10.भ 11.श्च 12. *dropped*
13.रा

1,2,3 ६ दोवीजकांडोद्भवाःमताः ५० कुंकुमार्द्रकसोनालकुदाकंदसमुद्भवाः।पलापरो।
4,5 त्पलादीनिवीजकंदोद्भवानितु ५१ यथाद्रुपक्वात्फलतोविशोषिताद्विरूपवी।
जंपयसानिषिच्यवाविशोषितंपंचदिनानिसर्पिषाविडंगमिश्रेणचधूपयेत्ततः
५२ क्षीरेनिषिक्तंवीजंवृहतीतिलसमसर्पिषालिप्तंगोमयमृदितमथोसंसद्योजा
6 येतक्षपितंवसया ५३ पयसिनिषिक्तंवीजंगोमयपरिमर्द्दितंविशोष्यततः।माहिषकं गम
7 चिंडंगचूर्णैर्वद्धुसोमृदितंप्रजायतेत्तनं ५४ क्षीरेणसावितमनातपसाधुशुष्कंस ६

1.ताः 2.कं 3.ए 4.थ 5.क्का 6.क 7.शो

1,2 पिष्टैर्विमिश्रहहलीतिलनालसत्या। आलोलितं प्रवरमेतदपि स्नुवंति बीजं विसु

3,4 द्धमत यो पुवनाय धीराः॥ ५५ माकंदजंबुपनसोद्भवमार्द्रमेव सर्वोत्तमं सकलसर्ववि

5 धानयुक्तं। शुष्कं च सर्वपरिकर्मयुतं वरेण्यं साक्षीरिकावकुलयोर्दुरलूर्बिताद्यं॥

५६ ऐर्वारुसंभवमनल्पगुडाद्विताभ्यु सिक्तं त्र्यहं प्रतुरपत्रपुटीनिबद्धं संस्थितलेस

ततवह्निनिवेशात्स्वमेस्म सोहृतं वपनयोग्यदशामुपैति ५७ एवंविधेन विधिनापरि

संस्थिता निर्वीजानि संततिसकलान्यपि शोषना नितजाश्वरनमचिरात्तरचोवहंति॥

1. पिं 2. विं 3. व 4. प 5. स्यात्

७ 1,2,3 पुष्पंफलं प्रचुरमुत्तमपत्नमपुष्टावाप्य॥ ५८ शुचिः स्नातो विलसद्वसनममलं प्र

4,5,6,7 जितमुरोगुरूनत्वा हस्ता त्रिसुवसुमतीब्राह्मणगुणयेत स्वयं बीजान्यादौ वपति कृतिवि

8, 9 द्याभुसुरसंपन्नमुस्यंत रत्वा तदनु वरितोन्यापरिजनः ५९ बीजधानी तृणश्रीणं कृत्वा

10 सिंचेत्पयोंबुना। जातांकुरान्सुसलिलैर्निष्टूर्णां शोषयामानये ६० सुरूपप्रतिपदा।

11, 12 पूर्लीपंचमीचतृतीयांदशमी। तिथयो गुरुशुक्रेन्दुसौम्यानां वासराः स्मृता। ६१ विशा।

खावारुणमूलमृगचित्रोत्तराश्रयं। प्राजापत्यानुराधा च तथा ज्येष्ठा च कृत्तिका।

1. *dropped* 2. *dropped* 3. या 4. दत्वा 5. वसु 6. गुणवते

7. दौ 8. म 9. न 10. येत् 11. र्णी 12. त्र

राम ७

1 नद्द्वाणिवन्नाम्राणिछिरंलग्नंचनोप्तनं ६२ इतिबीजोप्तिविधिः ॥ द्रुमसंप्रुष्यचयां

कीर्त्तितलम्रात्वाद्यवाहिते ॥ तत्रदेशेसमेरम्येवृक्षानारोपयेद्वपेत् ६३ स्रवंतिचतुर्दि

2,3 शायोउन्नाविंशतिहस्तेसदंताला नि ॥ क्रमन्नेनिंदितमध्यमवरमितितस्संपदे नियतं

4,5,6,7 ॥ पंचचतुष्पथहस्तप्रमितःस्याङ्डालिनांतरालंच ॥ त्रिद्विहस्तेस्त्रहतूगादीनांप्रयत्नेनः 8,9

10,11 ६५ अतोहूरेनिवासीतिरसंपत्तिस्वहस्तः ॥ तस्मान्नान्यथाकार्यंतस्संपत्तिमिच्छ

12 ता ६६ गर्तेचिरकृतेष्टकेसर्वतोहस्तसंमिते ॥ सम्यग्दग्धेतुसंश्लिष्टगोकीकसक

1. उ 2. रा 3. दो 4. स्त 5. तं 6. चतु (?) 7. ई

8. *dropped* 9. *dropped* 10. त्ति 11. त्ति 12. कृ

रीषके ॥ ६७ तत्रस्थलावसंत्रीतेसम्यपहतेसति ॥ सिक्केकृणपतोयेनसाबम्हत्याक्षिप्तेस्ति ॥

६८ माकंदहाडिमादीनांकृष्मांडालांतुकस्पचावपनंकीर्त्तितंश्रेष्टंरोपणंचविशेषत

1 ः ६९ ऊमिस्त्रष्ठसवीजानांस्थानकेस्थानकेस्थानकेप्रुसेारोत्रेसुसारकेसर्वशाका

2 नामितिवाहिते ७० ऊमिर्मसवकक्षात्रतथादमनकस्पचा ॥ कल्पितात्स्वकाकेदारेकी

3,4 र्त्तिताकुंकमस्पच ७१ एकैकंस्थूलवीजानेलघुवीजान्यनेकशः ॥ अग्राग्रेणैवनारं राग्र

5 गवीजंवक्षेणनिर्वपेत ७२ भ्रिम्भिश्रितंचारफलणिक्ष्काहिवीजंवपेक्रामपयमाः

1. *dropped* 2. म 3. शः 4. ह 5. मृ

1,2,3,4 तेनततोजलेनोष्णपरिदग्धपाणिनीतश्शुणैरंतर्हितं निषिंचेत ७३ सहजपरिपक्व
5 कदलीफलनिभास्सरणिकिरणपरिशुष्काः॥ षष्टिकपलालरज्जुर्निहितागर्त्तैनिदा।
तरिता ७४ स्नोकजलैःपरिसिक्तानिरंतरंशुचिरदिवसेषु।इहतेनमलनीलघ्रा।
तिमांकुरसंचयंनिपतं ७५ अष्टादशांगुलमकोमलकर्कंवासंरोपयेद्विगुल
6,7 गोमयसंस्कृतांके।कांडंत्रिसागमथतत्परिपूर्यगर्तेसिंचेज्जलैर्मधूणसेकलम्हस्तिका
8,9 सिः ७६ अधुपचाधोसागंकुर्बरवातपतिकासवा कांडांशा उद्याकार्तिकमासेके।

---

1. *dropped* 2. ना 3. शनैः 4. शनैः 5. र्ते 6. सृ
7. त्ति 8. र्ध 9. डा

1,2,3 दारेस्नावपेत्सलिलैः ७७ यावन्मासद्वितयंपन्नवितसांततःसमुद्हत्य।आषोढेचय
4,5 थादिवांछितदेशेनिरूपयेन्निपुणः ७८ आनम्रचोतपोत्थानुदाडिमीकरवीरयोः॥
6 कांडानारोपयेन्मूलेदत्वागोमयमुत्तमं ७९ निषिंचेछलिलैर्नित्यंयावन्मासद्वयंस
वेतःततस्त्वानमध्यतश्छिंद्याच्छिरसंजातपल्लवान् ८० सर्वांकंदावपेद्धर्तेसर्वतोह। राम
स्नसंमितेमांद्रसेकतसंमिश्रमृत्तिकापरिपूरिते ८१ कदलीरोपयेन्मूलेदत्वागोमय ८
7 मुत्तमंरोपयेन्मूलितोगर्तेदत्वापचतुरमंभुव ८२ आरोपयेद्वालतरूनमनीषीछानां

---

1. न्मा 2. ता 3. षा 4. रु 5. न् 6. त्स 7. ल

1 तरं हस्तमितं दिग्रान्तः । ज्योत्स्नामृणालाज्यविडंगलिप्तमूलान् सुगन्धैः क्रिमिदासमेतान्

2 ८३ तथा महान्तोप्यगुरोपणीया मूलाग्रिकावेष्टितमूलदेशाः । प्ररोहकाले परवा

3 सरस्य संस्थाप्य सर्वे क्रिचमुंत्रपेलन ८४ हेतुर्ज्ञात्वा मितः स्थानान्तेष्वायाम्य गुणे न्त

4,5 रान् तथा सेकं प्रदास्यामि निर्दिष्टं येन यान्ति ८५ वृद्धिं पादपमिलन्त्व ज्ञा दिसयव

र्जितः । तत्रैव पालयित्वा मिश्रित्वं पुत्रमिवाचलं ८६ श्रावणे ह्वीरिकाच्छतदाडि

मीवकुलादिकं । साडेचराजकोशाम्र लकुचादिवपेद्बुधः ८७ आश्विने गोल

---

1. घ्रि (?) 2. ? 3. व्य 4. त्वं 5. ज्ञा

---

१० वार्त्ताकपल्लवीनिचकार्त्तिके । फणिज्जशातपत्रीकाधान्यकंमूलकादिकं ८८ फाल्गु

1 नेचपटोलादिचैत्रेकुकारुकादिकं । रोपयेत्कदलीकादिसुधीर्वैशाखशुक्रयोः ८९

2 आषाढे निर्वपेत्सर्वान्नरोपयेद्बकुकामतः । सहः सहस्योमाघस्तु वपने दोषविगर्हितः ९०

सर्वद्वृक्षा निवेशानां सर्वदिक्षाधिरोपयेत् । सिन्तोटंयन्नतः प्राज्ञः पादपारोग्यहेतवे ९१

3 फलिन्यशोकपुंनागशिरीषानिंवपंचकाः । पंगल्याः प्रथमं शेष्याः सिंदं तिचगदाप राम

4,5 दाः ९२ पूर्वस्यां करमर्दं वंशाविटपाः पारावतादक्षिणे कौबेर्या बदरीकपित्थतरवोधा १०

---

1. का 2. श्च 3. चंपकाः *(according to Majumdar)* 4. दः 5. बे

1,2,3 ऽीचयुक्षाछिवा।अन्येचोत्तममध्यमाहाधमनिकारोण्या।अवर्थे:समंकृत्वाचांतरकं
4,5,6,7 यथायथसमीपत्रेक्षुवर्येकृत्वा: ९३ मुंडपनंद्यावर्तेषुछिकचतुरश्रसर्वतोलडेः।वी
8 थीनिकुंजकुंजकविन्यासेःपादपारोपणा: ९४ मध्येशपुष्पाःसफलावाह्येतत्परतो
परोवृक्षाःकार्याश्चतावृत्यासाचापिपरिखावृता: ९५ इतिविदितविधानःनापिविं
9,10 ताविधानःसततसुरगुरुतोषःखातितात्रोपदेशः।।निजभिववृंतोकंनिर्दृपेत्साज्ञ
11,12 त्रोकंतदवनिजविशेषाकामतोज्ञानशेषान् ९६ इतिवपनविधिः स्तलले 13,14

1. प 2. *dropped* 3. स 4. र्य 5. स्पृ 6. स्ति 7. स्र
8. ष्पाः 9. व 10. ? 11. ? 12. ? 13. व 14. त

1,2 ११ पादपाणवपरत्रेहचशर्मणेयस्मादनंतदाहिरण्यतारणाभुरवोपमी ९७ अतोधर्मा
3 र्थकामानांछायापुष्पफलादिभिः।।पसाधकतमावृक्षाःपालनीयाःप्रयत्नतः ९८ नी
4 हाराद्धंडवाताद्यश्रमाद्देशानरादपि।जालकारात्प्रयत्नेनरक्षणीयाःप्रमारुहाः ९९
5 लेपनंतिलखलीभूमिरात्रकल्के:सेकःपयोंबुसिरथोक्रुणपांबुसिर्वा।क्षौमघृतना
लिनाप्रतिकर्मकुर्याद्विलसत्कर्मकृद्वालःकिलपादपस्य १०० वराहविद्धसांसमं १४
6 ज्ञमशिषकशोणितंपञ्चस्थंसजलंत्तमोक्रुणपंपरिकीर्तितं १०१ तुरंगमत्स्यकमत्स्यानांमे ११

1. घ्रा 2. त्त 3. या 4. आ 5. पो 6. ज्ञा

1,2,3 पच्छागलस्कंधिगणां।सद्याध्रं हियथालालसं।मेदोसृज्ञापलंतथा॥ २ तान्सर्वान्नेलताह

4,5,6,7,8 त्वावक्ष्णोनीरेणपाचयेत्।सम्प्रकुपलांश्च भिन्तिप्रसांडेश्चिग्घेधिधापयेत ३ छली

9,10,11 कृत्यवलिर्देयास्त्रिलानांमाहिकंतथा।स्त्रिन्नांस्तुसरसा न्मारवांसुतुंदद्या हुतं 12,13

14,15 गुरूंवस्तुक्षिपेत्तत्रमात्रानास्ती हकसाचिता।एकैकंछापयेस्लांडेको छस्थानेभ

16,17 षिणा ५ कुणपश्चसर्वेदेवंतरूणांपुष्टिकारकः॥ संमतेनमयेाःख्यातंपथो कें:गु

18,19 थिसिःपुरा ६ इतिकुणपजलं १ वालस्यहद्धयेदेयासमप्रमे३दिनेामतसमांसतिले।

सिद्धाक्षशारनीतलातरोः ७ नवारोपितहृक्षाणांकार्यमातपवारणंयावत्सबाल

---

1. म 2. क 3. तः 4. म्य 5. क् 6. प्य 7. चू
8. र्णी 9. ति 10. स्त 11. त्र 12. द्दृ 13. तथा 14. त्
15. नी 16. या 17. मृ 18. सप्तमे सप्तमे 19. त्स्य

---

१२ संकाशाजायंतेपादपानवाः ८ प्रतिवासरमेवैषांसायंप्रातर्निषेवनं।दातव्यंत्वथपर्यंते

पश्चाद्दंजांगलेवने ९ सकृदेवाल्पमात्रेपेसेचनंपंचवासरं।सायंप्रातस्तथाल्पाल्पंद

द्याहमुस्तथात्मके १० सेकस्थिरप्ररूढानांदिवसांतरितोहिमे।वसंतेप्रत्यहंसायंत्रिका

1 लंनित्यमातपे ११ वर्षीत्रारदिनोदेयोदेयोवान्नावर्णवने।अथधीफलसंस्कृतोरसोह

त्वेवसापयः १२ कुणपांबुशाकन्मांसान्नीतिद्रव्याणिमेदवै।मांसकिंएवक्षिप्तांसोसिःकु राम्र

2 णपांसोविमिश्रितैः १३ सर्वंतिफलपुष्पाद्याःसर्वास्तरुहजातयः १४ त्वणानुपांत १२

3 दोन्नाश्चसर्वतःपरिश्रोधयेत।कुद्दालयेन्नरूणांतुमूलोपांतविचक्षणः १५ सिद्धार्थपा

---

1. देयोऽदेयो 2. न्यु 3. ऽो

1, 2 र्थकुसुमैः शाशमांसस्तुक्तैर्जंतुघ्नैराहितनिः स्नासहितैर्धूपदद्यात् आधूपितावापगताखि
3 लदोषसंशाकाः पुष्पैः फलैः परमतोषकरा भवंति १६ कदलीदलसिद्धार्थसफरीधू
पधूपिताः पुष्पैः फलैः सुसंपन्ना भवंति तरवो चिरात् १७ हरिणकोलवसामधुसर्
4 प्पिषा निकुलसंसवपल्लववारिणा अचिरमेव भवंति निषेचिताः कुसुमसत्फलसार
5 स्ततो द्रुमाः १८ घृतविडंगपयोंवुमधुप्लुतानंतकृष्टाजरजः परिधूपिताः अचिरमुन्न
मपुष्पफलान्विता विटपिनः प्रभवंति पयोदवः १९ सदाजगरधम्मीणवसासिः परि
6 रिखेचिताः पुष्पैः फलैः सुसंपन्ना भवंति सकल्पलताः २० विदारवृश्चिककंटेन धूपिता न्न

1. घ्न 2. ? 3. शफरी 4. चि 5. ? 6. ल्ता

1, 2 १३ फरीघृतैः कोलसूकरवसासिक्ता ध्रुवं तेषु बध्यं फलंलता २१ ताम्रचूडनृशंकचूर्णसम्मेलेदत्वानि
3, 4 षेचिताः मत्स्यमांसोदके दीर्घानता पुष्पैः फलैर्भवेत् २२ पाक्ता कोल्हफलोदकसर्प्पिर्म
5 धुसूकरवसासिः मधुरसाढ्यमहाफलनम्राश्रृता भवंति परिवृक्षाः २३ गोकोलशिशु
6, 7 मारोष्ठमांसक्वाथांवुसेचिताः सफरीतिलचूर्णाक्ताः फलंति तृणपादपाः २४ मैरेयकिण्व
तिलमाषमूत्रासवेष्व द्रोणाद्विते मलवणैः कृमिशात्रुपुत्रैः आलेपिता निशिमहत्फल
सारनम्राः स्युर्नालिकेरतरवो निकवद्भ्वास्य २५ क्षारोदकेन यवचूर्णघृतेन नालिकेरद्रु राम
8 माः कुणपजलेन थवा घृतसाः नित्यं वहंति घटपीनफलानि नूनं पाण्णामलाः परिफलंति व १३

1. त्का 2. श 3. त्स्य 4. प 5. मधुररसाढ्य 6. श
7. ति 8. ?

माषसर्षपैः २६ सितसिद्धार्थकतोयं यवतुषपिण्याकधारणं तथा। खर्जूरीकमला
1,2,3 द्रुमलकुचानां पुष्टये स्रवति २७ माजारविषहरिणं द्विपभ्रककरणं मांसेन तस्य विन्ना
यामहिषीपयोसिः। स्याद्दाडिमीमधुरत्व रिरसाढ्यबीजगर्भातिपीनफलसारनता तिन्न
4,5 सा। २८ स्याद्दाडिमी पुष्पलान्वितकेशमांसपिंडोपचारविधिसम्यगवाप्तसिं। आ
6 सावि लापि सितसाधितवारिपूरैः प्रख्यादुत्तरहिमगर्भफलावनम्रा। २९ वराज्यसफ
7 रीन्द्रोद्धलिम्रा; संधूपिता मता।। स घृतत्रिफलाचूर्णैर्दाडिमी स्यात्महत्फले। ३० दु
ग्धेक्षीरसं सिद्धैस्तथा शफरिकाजलैः।। संस्पृष्टा दाडिमी स्याद्रुमहाफलनतासवेत्त

1. र्जा 2. ण 3. स 4. प 5. प्रिः 6. ञफ 7. त्ता

---

1 ३१ दाडिमीफलसारा<u>ऽच्छाप्यु</u>पर्य्युपरमंडिता तथाम्रा तलस्तः कुंसमुरवालंकृतमस्त २४
का। ३२ फलत्रिककाथचयेन सिक्तो बिल्वपितस्याप्पुष्पलालकेन वहूनि धत्ते पनसः फ
2 लानि स्याद्व्यनच्छीनि महत्तरा<u>नि</u> ३३ यष्टीमधूकतिलमाद्विकमिश्रतोयैः पुष्पस्थ
3,4 क्रुणपतर्पितमूलदेशाः। पीयूषवह्न्यसुरसीनि बिल्वयीनानि मंजुलिफलानि वि
5 लर्ति कोल। ३४ कर्कंधुकालकुचवदरीधात्रिकाजंवृश्च शाले खितलाज्यैः समम्
6,7,8 स्नुरं गरो धूपकैर्यवाद्यैः।। सम्यग्लिमा तिलमधुयवैर्भूषिता द्वादशाहं क्षीरं स्रोसि। राम
कुसुमसमपये सेविता सत्फलाम्रा ३५ तथैते सर्वदा सीधुः पूर्वसंसेकतर्पिता।। पीयूष २४

1. ? 2. णि 3. बहूनि *to be inserted (?)* 4. ल 5. बु
6. श 7. क्षी 8. भो

1 ह्यपीनानिफलानिपरिविस्रवंति ३६ धत्ते बिल्वाःकपित्थस्यफलानिस्तुरसांन्यपिआसुव
2,3 ह्लनिवसंसक्तोगुडाजाज्जीरमाद्रिके: ३७ अनवं टणकरीवसस्मरानिशापिडितमू
4,5 लतुचा:सदाकदल्या:।कषपलशालिले:कृतानिषेकादधतिफलानिवह्लनिपीवराणि
6 ३८ व्रीहिमाषजलेश्चमा:संतितिंडुकपादपा:।निकुलच्छदतोयेसुफले:पारावताःन
ता: ३९ सक्षीरमांसजषगोमयशालिकिण्वतोयोल्वणोस्निलखलीसलिलै:सुदृशा:।
नश्रासवंतिसृदुमांसलजुंसपीनपक्वाडुसि:फलसरै:खलुमातुलुंग्य: ४० खंडस
7,8 वलितफेरवामिषैस्तर्पित:फलितबीजपूरका:।आमिषांबुगुडदुग्धतर्पित:सत्फले

1. सा 2. क्तो 3. व 4. स 5. ह 6. ता (?) 7. पू 8. लो

1,2 १५ सवतिनागरंगक: ४१ जंतुघ्नमाषतिलसर्षपयवविल्ववारिसुरैस्रुमांसखाकुमांसपयस्समेते:।सि
क्तासवंतिचकाकामिषलेपधूपैर्नारिंगका:फलसरैर्विनताप्रयुक्ता: ४२ अंकोल्लवल्कल
रज:कलयान्वितस्यमांसस्यजालिनिनिशाफादलसंस्कृतस्यासप्रधूकातरुफल्वणपिंडधू
3 पै:कर्पूरेणुरुचिरै:कुसुमैर्विसर्हि ४३ सौवीरमुद्गदधिकोलतिलै:ससीधुद्राक्षि
काचकुणपेश्चसवंतिद्रशा:।श्यामाकदंवकरिकेसरकासमृद्धपुष्पोच्चयैरतिसुगंध
4,5 लारैर्विनम्रा: ४४ जंबूपल्लवकोसीरमुस्ताक्काथै:सुराश्विते:।पुष्पाणांजातय:सर्वा १५
6 :परिपुष्यंतिसेविता: ४५ एलादिगंधद्रव्याणांज्ञालिलै:परिषेविता:।आमिषक्काथसं

1. ? 2. श 3. क 4. रै 5. बू 6. स

1, पुष्पापुष्प्यांद्याकेतकीसेवेत ४६ दत्ताहारास कन्तो येस्त्वथा पुष्प्यति केतकी कांतास्य
2 मदिरासेकतो पितो वकुलद्रुमः ४७ नखाग्रेणैव कामिन्या कुवाराग्रेण लेखितः ॥ वि
3,4,5 सर्न्ति पुष्कुलव्याजाल्माकंदः फुलकोजनं ४८ सिंजन्मनोज्ञतरनुपुरसांद्रला ८ ॥ नि 6,7
8,9 गारुणांघ्रिकमलेन सविलसंपचा आताडितो वनतपास्मर वेजयंतपा पुष्पोद्गमं वितनु
ते नितरामशोकः ४९ आलोलकंकणमृणालमनोज्ञवाहुवल्ली विलासपरिरंभरसे ।
समंतात् । आलिंगितः कुरवकस्तिलको ऽवलोके । पुष्पश्रियं वितनुते च तरंगनापा
। ५० कन्येव चारुनेपथ्याकृतकौतुकमंगला । आम्रपाणिग्रहान्नपामा पुष्पत्यासन्नरा

1. ष्पा 2. ? 3. न्मा 4. का 5. र्ज 6. क्षा 7. रा
8. घ्रि 9. नु

1,2 १६ खिना ५१ विधिवद्वासरणी नित्का दिनांते माधवीलता । करवीरः कुरंटश्च विसन्तिकु
3 सुमश्रियं ५२ पुष्पश्रियं वितनुते तृणवङ्घ्रि लोलकीलाकलापकवलेः कलिता च मल्ली ।
4,5 नि क्तापयः नावलनीतुलवारिपूरैः सपाटपाटला च मधुपैकविलासल्लमिः ५३ कर्णासि
6,7 काजपपलेन कृतासिषेको यूथी पयस्तिलकरीषजलेन चमा ॥ समच्छदो वितनुते वरपाषु
8,9 न्नोसांशे फालिका पलझषाद्यपलांबुचमा ५४ सोर्येक्ति विर्सटी लां बुककौरुचपुसा
10,11 दिकाः ॥ संतिकोला छिविद्रूपैः फलाद्याः शाकजातयः ५५ आप्युतदुलमंडेन सिक्ताः प १६
12,13 र्यधितेन चासदेवालांबुकाधत्ते फला निषचुराणपि ५६ परोलाः फाल्गुने मासिरुणा

1. सि 2. र्ति 3. तृ 4. सि 5. पै 6. को 7. पु
8. झ 9. टा 10. ट्धू 11. तं 12. र्यु 13. तृ

1, 2 नलकरालिता।।चेत्रेफलंतिसंसिक्ता:संधिते:खलिकाजले: ५७ तरोर्निर्वोप्येद

3,4,5 ञ्जिंसस्मवज्ञाग्निसंसवं।विकीर्णवस्त्रवद्दंचद्दोत्रेतुहिनपीडनं ५८ विकीर्णदक्षिसमि

श्राः ज्ञालिसक्ताःसमंततः।द्रोत्रेषुकरकाश्टिंवारयत्येवतत्क्षणात् ५९ मंत्रेणानेनला

6,7,8 ज्ञासिर्लिखितेःकदलानली।मूषादीवारयत्याशुद्दोत्रमध्यत्रिकोणके ६० यथा।।ॐ

9,10,11,12 क्षिकि:किंधातः।परगसदारकपरमेश्वरपरमवैष्णवअगरपराक्रमविजितार्कमंडलोपश्री

13 तः।श्रीमद्दरमद्देवचरणविजयिनः।।अमुकदेत्रेंमूषकागंधिकासलसादीनसमाज्ञापयं

14 ति।यथा।एतद्वाज्ञादेज्ञायद्दकदर्शनादेवद्दोत्रमिदंविहायान्यत्रयास्यथानोचेत्।हन

1. तै: 2. लै: 3. ज्ञा 4. तु 5. र्णा 6. ली 7. दले
8. स्व 9. ष्किं 10. ? 11. जी 12. वि 13. श 14. ?

1 रदेहरपचरवज्जलांगूलेनडुंफट्स्वाहा। ६२ पत्रेमंत्रमस्मालिख्यजद्यातंनिधनेक्षुवि।

७ केचकीटपतंगाखुपिपील्यादिविनश्यति ६३ इतिविविधक्षुसिद्धकर्मयोगाक्षत्तरमध्य

मनिंदितानशोधाराशिमुष्ठुवजरटेषुपादपेषुघातिविहिताविदधत्यमीक्रमेण ६४ इतिपो

षणाध्यायः।। ।शरीरागंतुभेदेनद्विःप्रकाराःसमासतः।सर्वतरुहजातीनामातंका:परिकी

र्तिताः ६५ तत्रवाताकफात्पित्ताच्छरीराणांसमुद्भवाः।आगंतवःसमुत्पन्नाःकीटव्या।ला १८

दिसर्सवेतः ६६ तत्ररूक्षाकषायादिद्रव्यैरत्यर्थसेवितैः।स्तंभिसंशोषणाहृद्देसवंत्पनल

जागदा: ६७ तेकार्श्यपक्कफलताग्रंथिगुटिकारूढपत्रता।कर्कशत्वाल्परसताशुफलताचिर

1. त्रं

1,2 तिकीर्त्तिताः ६७ स्वाद्वम्लस्निग्धोष्णशीताद्यैर्द्रुमेरत्यर्थसेवितैः ॥ हिमागमे वसन्ते च सवंति
3 कफजा गदाः ६८ तेषामतिकालफलता पांडुत्वं कुड्मपत्रता ॥ अवृद्धिःफलितेनीरसता
4,5 चेति कीर्त्तिताः ७० कट्वम्ललवणोष्णतीक्ष्णेरुक्षेरत्यर्थसेवितैः ॥ सवंति पित्तजा रोगा ग्रीष्म
6,7,8 कालेघनात्यये ७१ तेषां पीतपत्रताकालफलशातो विशोषणं ॥ पत्रपुष्पफलस्रावा निःम
9,10,11,12 दनं चेति कीर्त्तिताः ७२ कृमिसंजग्धमूलानि शोषणं पीतपत्रता ॥ सचेच्छु जातपान्नां पल्ल
13,14 वस्रावा निकृन्तनं ७३ प्रचंडपवनोद्योरिसंगेमूलनमोटनं लग्नस्रावविसेदेनतत्र संगो द्विधा
15 सवेत ७४ वह्निवज्रादियुष्टानां तदंगपरिशोषणं स्मेर्निःसारसावेन पानीयासावतस्त

1. ट्र्‍ 2. सं 3. ब्ज 4. प्र 5. ष्म 6. *dropped* 7. स्रा
8. ल 9. प्र 10. ता 11. च्छं 12. त्लू 13. स्र 14. भं
15. जु

1,2 था ७५ सर्वेषां रुहजातीनां शोषः सप्रुपजायते ॥ कुवारादिघातेस्तरुहाणां व्रणो सवेत् 3
4 १८ ७६ अव्रणेपिपरिस्रावो जायते कफदूषणात् ॥ मिथ्योपचारतोरोगो यथास्ववातजादयः ॥
5,6,7 ७७ दिनेदिने पचीयंते पत्रपुष्पफलादिभिः ॥ अत्यंतु सेवपाघर्म्मो स्रूदोषाः कालदोष
8 तः ७८ कुद्दावातादयो दोषाः पांडुरोगं प्रकुर्वते तेनार्ताः शाखिनः संतिपांडुच्छदाःफ
लच्छदाः ७९ वीजस्य दोषाद्दकतोपचारान्मिथ्योपचारादपचारतो वा ॥ कुब्जाः प्रकुर्वंति
9 समीरणाद्या वंध्यान शोषान वनीरुहांश्च ८० दोर्गंध्यं गंधविस्रंसना पत्रपल्लवकुञ्जता गम
पिपीलिकादिसंगाश्च यानीयाजीर्णतो भवेत् ८१ जलवहपवनान्यवृक्षघर्षाः सततमना १८

1. ठा 2. न 3. त् 4. स्रा 5. नि 6. *dropped* 7. से
8. फ 9. श्च

1 तपदेशासंस्थितात्स्वाक्षगनिचयनिवासवल्मितानोपगलन्त्रणनिचन्माखिनास्नाकानि

2,3,4 ८१ इतिविविधगदानवेक्ष्यनित्यंनिजनिजकीर्त्तितलक्षणैरमीभिः।वरतरमतिस्त

स्मसत्यपत्नोधरणिरुहेष्ठुचिकित्सितंविदध्यात् ८२ इतिरोगज्ञानाध्यायः १ अ

5,6,7 थचिकित्सा जयेद्वातसत्वान्नरोगान्मांसमेदोवसाघृतैः।सेकः।सर्व्ववातविकारजान्

8,9 ८५ अरिष्टगोश्टंगजरंगकेशोनाणैः।ससर्प्पिः।भ्रिसुमारतैलैः।सकोलमेदोसिस्ट

10,11 रक्षपैर्निवः।रयेत्मारुतरोगमाशु ८६ कषायैःकटुकैस्तीक्ष्णैः।कफकृताज्जयेत्।पंच

12,13 मूलंकृताक्काथैः।सुरलीसलिलेनतु ८७ सितसर्षपकल्कंचमूलेदत्वानिषेचयेत्।ति

1. ति 2. क्ष्य 3. णै 4. सं 5. कुणपतोयैश्च (?) 6. वा
7. द् 8. शि 9. शु 10. वा 11. रोगान् 12. त 13. लि

1 १९ जल्तिजलैःसर्व्वकफरोगनिवृत्तये ८८ उद्दृत्यां क्रिमर्दनंत्ररूढाम्न्यांमर्दंन्यसेत्राव

लामरोगिणांप्राज्ञसद्योगविनिवृत्तये ८९ शीतलैर्मधुरकषायैर्द्रव्यैः।पित्तसमुद्भवान्।

2 सर्व्वरूरुहजातीनांरोगानपनयेत्सुधीः ९० क्षीरेणमधुमिश्रेणयष्टीमधुमधूकजैः।पि

3,4,5 त्तरोगाद्विमुच्यंतिसिक्ताःकाषेस्तुशाखिनः ९१ फलत्रिफलजैःसिक्ताःसर्प्पिर्मधुसम

न्वितैः।मुंचंतिस्तरुहाःसर्व्वेरोगान्पित्तसमुद्भवान्॥ ९२ उद्दृत्यमूलतःप्राज्ञाःकमीन्कां १९

उरकादिकान्।निषिंचेच्छीतसलिलैर्स्तरुहाञ्चसमवाप्सरान् ९३ पयःकुणपसिन्तोथ्व

6,7,8 चागोविट्जलंजयेत्॥सिद्धार्थाद्भवचाकुष्ठातिविषालेपनंकमीन् ९४ सिद्धार्थसमवा

1. त् 2. भू 3. त्त 4. ते 5. श्च 6. सा 7. ?
8. ठ (?)

1,2 विडंगवचोघोणेर्गोमांसांहसेरिलविषाणकपोतमांसैः॥ सिन्नातचूर्णसहितैर्विटपेषु धूपः स्त
3,4,5 द्योजयेत्कृमिचयं किल रूरुहाणां ८५ लेपो विडंगोऽसघृतैर्निषेकः क्षारांबुनासमदिना
निपाकतागोमांससिद्धार्थतिलोयनाहः कांडारकादीनपहंति जंतून ८६ सेचयेत्कृमिसि
6,7 जेग्धुलतां च खलिकाजले॥ जयेत्सम्ष्टकाचूर्णैर्धूलनं च कृमीन्दले ८७ जंतुघाति
लगोमूत्रसार्पिः सिद्धार्थलेपितः॥ संसिक्तः पयसा जंतुकृतः संरोहति व्रणः ८८ हिमवं
8,9,10 जातपात्रीनां कार्यमाछादनं वहिः॥ कुणपांबुपयो सिक्तपरिषेकाः प्रसिध्यते ८९ का
11,12 त्रोडुंबरवल्कलघृतमधुमदिरापयोसिरत्वतया॥ सुदृढंपलालरज्जावेष्टासंसिद्धत्वैर्खै

1. धु 2. स 3. च 4. यं 5. भु 6. ग्धां 7. ढ्रू
8. शि 9. ष्य 10. पू 11. ष्वा 12. प्य

1,2 १० १०० आश्चर्यसारमहिर्महिषीक्षीरेणसपदिसंसिक्ताः॥ सलिलाप्रशितम्लानसवंति सुच्छामहीरु
हासमाः १०१ प्रसशाखाश्चतत्छानेसंलिप्तामधुध्विषा॥ सिक्ता पयोंबुसिः संतिशाखारुहन
सच्छला २ वह्निदग्धाश्चतत्छानेछित्वा सिक्तापयोंबुसिः॥ कुलीरकर्पशरोयेश्च धूपितास्तु
सुपल्लवाः ४ सर्वांगेपद्मिनीपंकेर्लिप्तावह्निकरालिताः॥ कुणपांबुपयः सिक्तासंतिशाख
तांवराः ५ विदारीशर्करानागजिह्वातिलविलेपिताः॥ संतिसत्पल्लवावह्निदग्धाः सिक्ताः
पयोंबुसिः ६ शर्करांबुतिलक्षीरैःसेकाल्लेपात्सुमंततः॥ पद्मिनीकर्दमेर्लेपाद्वह्निशोषः
3,4 प्रशाम्यति ७ शोषिनिः सारम्हस्तेतां हरेत्स्थलमृत्तिकां॥ अन्यांसारवतीं तत्र प्रसिसिंचेत्य १०

1. स्त्र 2. सि 3. न्य 4. से

1 योंकुरिः ८ जलास्रावसमुद्भूतेविशोष्यपरिषेचयेत्क्षीरांभसासिःकुलीरास्थिक्षेपेःपंकपपेद्धतान्
2,3,4 ९ न्यग्रोधोडुंबरोश्वत्थगोमयधोत्थसर्पिषाप्रलेपनेविधानेनव्रणरोहतिशाखिनां १० धव
5,6,7 श्रीपर्णिकान्नपामावेतसोर्जुनवल्कगोमयधोत्थसर्पिषाप्रलेपनेस्ने::परिक्षितःप्रलेपेनद्र शि
8,9,10 खावः प्रशाम्यति ११ विडंगचूर्णसंमिश्रसाध्यंपंकविलेपने::जयेज्जलपयःसेकेरोगान्मिथ्या
11 पचारजान् १२ यवगोधूममसंसक्तचूर्णहोडपयोंसमांसेकेःसमाहमात्रेणपांडुरोगःप्रशाम्
ति १३ वंध्यामहीरुहाःसिक्ताःपयःकुणपवारिभिः:सवंतिपुष्पफलितेःसर्वोन्नापरिरक्षकाः।
12 १४ तिलपवकुलत्थमाषैर्मुद्गेनचसंस्कृतेःश्रीतेः।वंध्यास्वरचोनित्यंपुष्पफलेःप्ररयुतानां

1. ? 2. र्व 3. पे 4. न 5. वल्क ⇄ लैः 6. 'गोमय...पने'
dropped 7. प 8. स्रा 9. न्द्र (?) 10. थ्यो 11. म्य 12. यं

1 २२ १५ तिलाजाविन्नाकचूर्णपृथगाढकसंमितांसक्तुप्रस्थंजलद्रोणंगोमांसतुलयान्वितं १६ सप्तरा
2 त्रोषितंचैतत्सेकात्पुष्पफलप्रदं १७ व्याघ्रचित्रकगोमांसभ्रांसस्तजलोत्थितेः।करेणुमाहि
षीक्षीरैःसिक्ताःस्युःसफलप्रदाः १८ अजीर्णातुकरापेणतिलाकष्टाविलिप्यवान्नतिमूलं
किलहोडविडंगाद्येर्जलंन्यसेत् १९ गोकुकाराक्षिमार्जाररुधिरैःपरिक्षपिताः:सवंतिनीरुजा
3,4 :न्याकजातपक्षिपुसादयः २० धूपनंतीक्ष्णनवालेपुप्रयोजयेत्।मृद्वपालेपनंचातिमति।
मान्यविवर्जयेत् २१ इतिविविधविधिप्रयुक्तयोगेरुपवनहितान्तिमुपेतियस्यरोगाः।तमपरः २२
5,6 सुविशिष्टदेहेत्वमिदेत्नोधरणीसहंप्रतिरोपयेत्मनीषी २२ इतिरोगोपचारमाध्यायः २ सदा

1. त्तु 2. *dropped* 3. स्त्र 4. *A three-letter-word is missing.*
5. *dropped* 6. न्म

1 पुष्पफलापहिरकालफलपुष्पता ॥ तथागंधसमुत्पन्निरनछित्वरसान्यता २३ वर्णप्रवर्त्ते
2 नं पुष्पपरिहन्निःफलान्यता ॥ गंधप्रवर्त्तनंगंधवैधनंवल्लिपुष्पता २४ लतात्ववामनत्वंचमिश्र
3 ताचिरपाकता ॥ अपाकःफलदीर्घत्वंनाशःसंभूतिजन्मच २५ तत्कालफलतापुष्पफलवाञ्छ
4 न्मपीनता ॥ वियोनिजननंचेतिविचित्रंतत्षथाधुना २६ सुगन्धिकेशवविधातसंस्कृतेपुष्प
5,6 कमाकंदजबीजमुत्तमं ॥ द्विपज्ञकंरूमेनशाज्ञाप्रसेकछितविपेद्विजेनाप्यार्कमरीविसंचयेः २७
7 तस्मादजादुग्धनिषेकजातःसमुल्लसच्चाउमहप्रमुजाव ॥ फलानिपुष्पाणिसदेवधत्तेतरु
8 मैनेंस्रानिनवान्यविचित्रं २८ पिण्याकजंतुरिपुगोपलवर्णसिक्तैरिन्द्रोरसेःप्रमथितेर

1. *dropped*   2. :   3. ?   4. घ   5. व   6. ष्या   7. स्र
8. ज्ञा

२२ सिंचितमूलाः ॥ मांसंफलानिकुसुमानिमनोहराणिस्मीरहादधातिनरनमकालमेव २९
1 वराहिजरिक्षुरसैसचंद्रलेखा घृतेराजपघेटेद्विपज्ञमुसंधितेर्मूलमथोविलिप्यमृद्धि
ःप्रश्येक्षुरसासिंचिताः ३० धूपिताःकुणपज्ञोद्भैःप्रयत्नेनमहीरुहाः ॥ अकालेफलपु
2,3,4 ष्पाणिवितन्वंतिनतुसंशयः ॥ ३१ जंबुकवालघनवीरणमूलकल्कैरालिप्यतद्ववजलेरभिषि
चितस्य ॥ आसाद्यचूतविटपीसहकारलक्ष्मीमामोदमोदितमधुव्रतसख्यमेति ३२ अशोक ११
कलिकादीनांपुष्पवासितयामृदा ॥ मूलेसक्तेतिसौरस्यंजायतेसुमनोहरं ३३ क्रोडीवन्ना
सावितमाधुवीजाज्ञाताःप्रवृद्धाश्चवचासिंधैकेः ॥ फलंत्वचीजानिफलानिनित्यंकृष्मां

1. तैः   2. त   3. सं   4. श

उद्वर्तीकपरोलकाद्या॥ ३४ मधुपुष्पोत्पलक्वाथेद्धसिताय ष्टीकृतसरो॥पिंडो विनिहितोम्र
1,2 लरंडे ऽना सिफलत्वकृत् ३५ आम्रमूलं गलिविषांरहती दयेन पिंडीकृतेन परिशरितम्रलरड
3,4,5 ॥दृद्राक्षमीसिरतिषेचनत; प्रेक्षते तिक्तंफलं सहजमिष्टफलो पिन्नं ३६ विडंगयष्टीयव
6,7 कल्कदुग्धैर्गुडा विनैलेपनतो तिमात्रां विलिख्य मूले विटपीखसावतिक्ता; घुधाहृद्यफेला
8,9 निक्षते ३७ मधुककुसुमक्वाथयष्टीजाज्ञा सितायवे॥ गल्लिख्य लेपित; श्रिखोदक्तैर्मोपिच
10,11 मिष्टतां ३८ निशाकिंशुककर्पासीमंजिष्ठारो श्रवारिलि॥ श्वेतं पुष्पांतरो; सेकाद्रुते चामीक
12,13 रघृतिं ३९ मंजिष्ठादरदक्षीरकांजीपारावतामिषे॥ श्वेतं पुष्पांतरो श्रवारिलि॥ श्वेतं पुमूल

1. शि 2. त् 3. प्र 4. क्तं 5. पि 6. र्लै 7. फ
8. सिक्तो (?) 9. ध 10. श्वे 11. द्ध 12. घु 13. श्वे

२२ लेपात्स्वर्णनिलं सवेत ४० फलत्रिकापोथवचतवीजनीलीद्वै; संततमेवसिक्ता॥ मूले
चतच्चूर्णवपेनचूर्णैः फलानि सूते जनसंमिसानि ४१ यवकिंशुकमंजिष्ठानिशातिलसवेर्जु
ले॥ कल्के ख्वसेविता लिमा; फलं विस्वातिलोहितं ४२ शाल्मलीत्वग्निशानीलीत्रिफलाकु
1 ष्ठसीधुसि॥ लिप्तसंसिक्तमूलानां फलं स्यात्शुकपिंजरं ४३ नीलीनिशारोध्रवरातिलासने
2,3,4 कासीसुयष्टीसहितैर्विचूर्णैः पिते॥ प्रकीर्णमूला; परिखेविता जले; सुवर्णवर्णानि फलानि वि २२
5 स्रति ४४ नूनंकलायसहिता जगराहिवर्णं शलीकृता निवद्धकर्दममर्ह्नमूला॥ मांसोद
केनवकुला; सततं निषिक्ता; पुष्पं तिवमक्कुसुमप्रचयैर्नितांतं ४५ वराहमेहः कालानां

1. सी 2. शी 3. श 4. र्णि 5. ति

1,2 कोल्हपानीयसेचिताः कदलीकुसुतेर्विचित्रफलिता दाडिमीफलैः ४६ स्त्वकं स्वसालिलाप्लुत

3,4,5 बीजा जातस्तबछौवरंडाः पूर्वोक्तयोगासिक्ताः संस्कृते कारवेल्लफलं ४७ अतिलघितकुसुमस्तु

6,7 रसितसूत्रिकया श्लेष्मलदेशान्ना जलदसुरानतवालकपत्रकसेकेनं गंधपरिहन्ति ४८

8,9,10 धे धे पुष्फल्लकुसुमैररतिवासनासिर्भूस्थिर्नितातं परिस्रवितसूलदेशाः सुरामुरानंत

11 दलांबुसुरासिक्ताः गंधपरंवितनुते खिलपुष्पजातिः ४९ मेदःपयोरुधिरकुष्ठयु

तोयमेवयोगः करोति नितरां निजगंधवृद्धिं सापंस्तपुष्पसमये विधिवत्प्रयुक्तः पुनागना

12 गवकुलादिकपादपानां ५० आप्तरपेत्सहरगोपलमिश्रमस्त्रासंधानकेन दृढकर्पर

1. भा 2. वि 3. थै (?) 4. क्त 5. सु 6. नां 7. न
8. प्र 9. र्नि 10. न 11. धं 12. पु

---

२४ कं विशालं यत्नेन तत्र करवीरमुदारगव्यमांसांबुसेकविधिना जनयेन्मनीषी ५१ मा

1 तेगवाक्षिपरिस्रवितके सुदग्धे समाविते सुरसिमांसजलेन सिक्तो। न्यग्रसमूत्ररिसुर

2,3 सीपिशितांबुसेकाद्वल्लीचयेन परिपुष्यति नित्यमेव ५२ तिपुलाविततिलयवमाष

4 जचूर्णैर्जलाविते: सिक्ताः रजनीचूर्णपिधपान्निडिकावरलतासवति ५३ धा

5,6,7,8 त्रीवचासपासोतान्तुंपभानां वेतसस्यवा सिंशपासूर्यवल्लीनामष्टमूल्यप्तिमुक्तयो ५४

9 पुलासिन्धाश्चमूलेन श्वेते हीरेः कपित्थं जा सुसाव्य ज्ञातधावीजमासमाछाय्य ज्ञोधि २४

तः ५५ गर्तेवपेज्जलेन यसंसर्पिः दोदसमविताल स्मगोमयजंतुमतिलकोडामिषोस्थ्वं

1. श्च 2. त्रि 3. फ 4. वि 5. उम 6. पा 7. ल्य
8. योः 9. प

1,2 ५६ रजःसंश्रयेद्दर्दसुमस्त्रिग्धं तुरंगुलां शिक्तुमाषतिलद्रोदेमैत्स्यमांसोदकेन ततः ५७ से
3,4,5 चितो वल्लितां याति तज्जातो विटपो ध्रुवं ५८ लताम्रमालली रावधातकी माधवी लवचा वङ्कुशो
6,7 मर्द्दितो दीजाद विका द्वीरमिश्रया ५९ विपोनिरद्दां क्रिमृदा चिते वटे सम्पक्व कर्सिति
8 लचूर्णनु कुसिः तस्मात् दधिक्षीरजलावसेचनैर्यथा स्वमेव प्रतिजायते लता ६० पुरुषप्रमि
तेखाते सम्पक्व घटिते न वेष्टकानि वपेः जनितो यन्नवतात रुरमलधियावामनः फलति ॥
9 ६१ नातिवालतरुस्कंधे छित्वा दग्धोग्नि नामना क्र । आज्यगोमय सिंधूद्भव मधुमांसेर्विलिप्य
च ६२ सिक्त स्निग्धगंधः कीलविद्धमूलः पयोंबुना चारुशाखः स्वकाले शुचामनः फलति ।

1. स 2. त् 3. धु 4. ती 5. ? 6. ता 7. घि
8. स 9. ग्धे

1 २५ ध्रुवं ६३ चतुःसं ससता लंबो मूला सन्नकृते वटे । विन्यस्तो निपुणैः सिक्तो वामनः स्यात्पयों
2,3,4 बुना ६४ विपाद्युसवेत्यल जातिकंदमेकत्र संघट्य निबध्य सूत्रे ॥ सर्पिर्मधुसामंतु लिप्य चोप्तं
तथा तथा पुष्पचयं दधाति ६५ एवं निबद्ध कांडानि करवीरे विमिश्रकाः । दाडिमी जातिसेदा
दोकृतः संकुसतेस्तुतं ६६ मातंगजमदाक्तेन नवं गनलकेन तु । फलानि विद्धमूलस्य प
चंतिन हि वत्सरं ६७ सद्यो हततरु पक्व स्कंधवर्म्मणा न घतेत दृढं । महीरुहस्य नाशा याया तस्याः पाक
5 ःफलेन हि ६८ निहितासित वृषकं वलसवर्म्मस सपरिणद्दा । यान्ना बा खलु तस्याः फला २५
6 निपाकं न शङ्कुंति ६९ दंती दंतरजो वक्कितम्र हेमशालाकया । संसास्त्र वर्ध न्नरी मूले विद्धादी

1. धु 2. व्य 3. वों 4. ट्य 5. लो।न 6. ह्न

1,2 घेफलप्रदा॥ ७० करीषकोलेसतुरंगमाछिकाग्नौ तुसंतापितलोहस्य व्यापिद्राक दल्पारव
त्तुवल्लिमूलेकरीडदंतायतसंपदाःस्युः ७१ वराहदंष्ट्रानलिकाकयेर्बीदानासिद्धलीनिः
3,4 हिताप्रयत्नात॥ गसेस्यमूलेकुग्रालप्रलंवफलंकदल्याःकुरुलेनितांतं ७२ पयसार्जुनतर्को
5,6,7,8 रीलवणीडुप्रलेपितः॥ कुमोनरवृत्निसर्वेत्रात्वचाकोलाछिकीलिलुः ७३ सिक्तासंडुलतो
9,10 येननालिकेरोविनस्पतिः॥ कर्पासोनविराज्ञिंवपत्रसंस्तनवारिणा ७४ नाग्नायेक्कदलीमू
11,12 लेनिहिताहिंगुवार्त्तिकाः॥ त्राष्यांडेर्बीफकादीनिकुलीराछिविधूपनं ७५ अंकोल्हतैलः॥कुल
त्थक्काथतोयेनतरुःपुष्पफलंत्यजेत्॥ किंशुकार्जुनतर्कीरीलवणात्रधूम्रत्राणेनवा ७६ अं

1. द्धाः 2. ल्यः 3. स 4. ते 5. णां 6. ङ्य 7. त्र
8. तः 9. व 10. तिः 11. हिं 12. *dropped*

1,2 कोल्हतैलनरतैलमुसावितंयत्र ___ सावपरिपक्कफलाढिनीतां संजायतेकुटितितक्कर २६
3,4 काडुसिक्तमत्स्यावयोमिदमत्रनचित्रमंस्ति ७७ अनेकधुकोल्हजतैलकोलमेदोसि
षिक्तंपरिपुष्कमुष्मं॥ वीजंमुस्तमोकरकांड्डसिक्तंप्रजायतेसंप्रतिचनमेव ७८ वीजंस्वेष्मा
5,6,7 ततैलेननरातपापरिलावितं॥ करकाजलसंसेकोडुमंसद्यःप्राजायते ७९ अनेकधाकुर्कुा
8,9,10 टरेकसिक्तंदाडिमवीजंरविपुष्कमुसं॥ चमांसमेदःपरिधूपसेकात्प्रजायतेतत्फलतिद्व
णेन ८० अंकोल्हमत्स्यशिशुमारचकोलनक्रतैलासिसावितविशोषितवीजमुस्पंसेका २६
11,12,13 द्रावमितलेकरकांडुसिक्तेसृतेसपुष्पफलितंक्षिटितिडुमंहि ८१ फलितंमधुकर्कोड

1. बीजं स्व *inserted* 2. झ 3. धां 4. को 5. भा 6. प्र
7. कु 8. र 9. डिं 10. ब 11. झ 12. र्का 13. ट

1,2 कुंभांतर्गं महीगतं सेकात्पात्रसमानं स्यात् पिण्याकामिषवारिभिः ८२ फलं तालप्रलाकारं दाडिमस्य
सोपितः॥ विसार्त्तेत्रफलासर्प्पिः कोलमेदोसिद्धेचितः ८३ गोकोलाछिकरीषाग्निदग्धे सार
3 मृदास्तरेत् गव्यक्षुमूलको गर्तेर्वर्त्तमानः प्रजायते ८४ लिख्यात्रकुसुम कूष्मांडस्य कांडे मधुसर्प्पिषा
4 वर्ध्यापलालरज्ज्वा च गोमयेन प्रलेपयेत् ८५ ततस्तावेकतां यातो छित्वा मूलाग्रयोः क्रमात् कूष्मां
डवत्फलं सूते तत्कुसुमस्त्राव शोधितः ८६ कूष्मांडकफले वाल्पं छिद्रं विधाय चाथ लिप्तमधु
5 सर्पिर्भ्यां पिचुवीजं विनिक्षिपेत् ८७ तु संपरिणतात्तस्मात्फलादाकृष्य पत्तनतः॥ तत्स्ते विटपं पी
नवार्त्ताकस्थलसंपदं ८८ महिषीकरीषमूत्रैर्मृदितं सप्ताहमोत्पलं वीजांबरस्समोकरकाज

---

1. र्ग 2. फ 3. ज्वा 4. शे (?) 5. मौ

---

२७ लसिक्तं सूते हि करवीरं ८९ सिक्तो जगारक्षसर्पाद्यकलापोत्थितकर्द्दमे स्तसागोमांसतोयेन।
जायते पद्मकाननं ९० श्लेष्मातकस्य वीजं निष्कुलितं सप्तसावितं पेत्रूपा। अंकोल्हकस्य महि
1,2,3 षीगोमयघृष्टं त्वनातपे शुष्कं ९१ महिषीकरीषपटसायुक्तं करकाजलेन तं सिक्तं तु संर
4,5,6 जनरक्तमुदं क्षमदं कुरुते किमाश्चर्यं ९२ इति विचित्राध्यायः॥१ यन्नप्रवालस्यगितः॥
7 या निविकीर्णकुसुमाणि समीरणेन। शृहाणि कूर्यादसिमुक्तकानां लतासिरालोलमधुव्रता।
सि ९३ विलं विनोपयत तटकुसुमाच कुर्वि लोकांति प्रसवेन्ह्योणि रचासमंदिरं तः कलहंसतत्व २७
8 णाकाविस्तवेनुषकारणी मनोरमा ९४ निर्याद तोलिलं कुखावत तरणांतीरे कुप्रुषप्रुमाः कूज

---

1. षी 2. त 3. त्सि 4. जनयति 5. ता 6. नि
7. ति 8. स

1,2,3,4 विहंगमामतरुणीमात्यायतां दार्घिकां ॥ कुर्यात्तत्र समुद्यमस्कामलिनीपत्रांकुरज्ञामलां स्पा 5
मालोवनकालिकां विदधतींनीलोत्पलानि क्वचित् ९५ उपवनमिव वारिमध्यमग्नं विमलत॰
6,7 याप्रतिबिंबितं दधाना ॥ शशिकरनिकरेण शुरिनेव क्वचिदुपमेयपया ॥ सुखाय थापी ॥ ९६
8,9 मध्ये तस्मिन्सुस्निग्धनीरशिखरिसार्द्धवेश्मप्रवातं स्वढोपान्ते सुरतिकुसुमैः कारिवासितं स्नशा॰
10,11,12 खे ॥ स्थाने स्थाने स्फटिकधवलामंडपीमंडनाढ्यं कुर्यात्तस्मिन्नपिचकदलीमंडितं मंदवायु 13,14
15 ९७ क्वचिदपि रूपं कुर्यादुपवनदेशे सुमिष्टसलिलसरोसंसिक्तसकलविटपं वद्दंप
पाणसंचये ॥ परितः ९८ अंजनमुस्तोशीरैः सनागकोशातकामलकचूर्णैः ॥ कतकफल

1. 'त्कुब्ज' *to be inserted* 2. म 3. दी 4. ल्ल 5. इया
6. दनुमेय (?) 7. वा 8. न्तं 9. म्र 10. खैः 11. ल्तं
12. पं 13. हं 14. युं 15. *dropped*

1,2 २८ समायुक्तो कूपे योग्यः प्रदातव्यः ९९ कलुषं कटुकं विरसं लवणं सलिलं यदि वा शुभगं
3,4,5 धिसवेत्तानदनेन लवत्युलं सुरसं सुसुगंधिगुणैरपरैश्चयुतं ३०० अथ कूपार्थीनस्त्रिप
6,7 रीक्षा १ पातालाद्दुग्गमाः शिराः प्रसर्पंति सर्वतो दिक्षु ॥ नीरस्य तस्मिन्मध्ये ज्ञातास्ताः क॰
8 ल्पयेत्कूपान् ३०१ यदि वेतसोंबुरहिते देशो हस्तैस्त्रिभिस्ततः पश्चात् ॥ सार्द्धैः पुरुषैस्तोयं प्र
9 हति शिरापश्चिमे देशे १ चिन्हमपि चार्द्धपुरुषे मंडूकः पांडुरो हि मृत्पीता ॥ पुटसेदक
सातस्मिन्पाषाणे सवति बहु तोयः २ जंबूवृक्षात्पूर्वे वल्मीको यदि स्यात्समीपस्थः ॥
10, 11 तस्माद्दक्षिणपार्श्वे सलिलं पुरुषद्वये साधु ४ अर्द्धपुरुषे च मत्स्यः पारावतसः॰ २८

1. गः (?) 2. स 3. त्य 4. म 5. र्थं 6. र्द्ध
7. *dropped* 8. त्कू 9. शे 10. स 11. *dropped*

1 निसस्वपाषाणाःस्फुरतिलउनीलादीर्घकालंचवहतितोयं ५ वल्मीकोपचितायांगुंभ्रा

दक्षिणकरत्रयेन्माने।पुरुषद्वयेसपादेसवतिजलंस्वादुवामेणवं ६ रोहितमत्स्यो

2,3,4 र्द्धनरेमृत्कपिलापांडुरातततःपरतः।सिकतासशर्कराश्चक्रमेणपुरुतोसंवत्यतः।।

5 ७ पूर्वेणयदिवदर्याःवल्मीकोदृश्यतेजलंपश्चात्।पुरुषैस्त्रिभिरादेश्यंपश्वेताग्रह

6 गोधिकार्द्धनरे ८ सपलाशावदरीचेद्दिशपरस्यांजलंततोभवति।पुरुषत्रयेस

पादेपुरुषेत्रवडुंडुभश्चिह्नं ९ काष्ठोदुंवरिकायांवल्मीकोदृश्यतेशिरांतस्मिन्नाउ

7,8,9 रुषत्रयेसपादेपश्चिमदिग्गछावसावहति १० आपांडुपीतमृत्कागोरसावर्णश्चिस

---

1. ? 2. प 3. र 4. भ 5. र्यां 6. श्य 7. स
8. र्णा 9. *dropped*

---

१८ वंतियाषाणाः।पुरुषार्द्धेकुमुदानित्सोदृष्टिपथंमूषकोयाति ११ आसन्नोवल्मीकाद्

क्षिणपार्श्वेविसीतकस्ययदि।अर्द्धेतस्यशिरापुरुषेत्रयादिशोद्याच्यां १२ तस्ये

1 वपश्चिमायांदिशिवल्मीकोयदाभवतिहस्तेउत्तरेणःभवतिशिराचतुर्भिरर्द्धाधिके

2,3 पुरुषैः १३ श्वेतविश्वंभरकःप्रथमेपुरुषेतुकुंकुमाभोस्मा।अपरस्यांदिशिचशिरा।

4,5,6 नश्यतिवर्षैद्वयेनीते १४ सकुशासितयेशान्यांवल्मीकोयत्रकोविदारस्य।मध्येत

7,8 योर्नरैरर्द्धपंचमैस्तोयमत्स्यमघंक्लोस्य १५ अथतत्रभुजंगःपुरुषेकमलोदरसन्निभोमहे १८

रक्ता।कुरुविंदकापाषाणाश्चिह्नान्येतानिवाच्यानि १६ सर्वेषांवृक्षाणामधोस्थितंदु।

---

1. स्त्र 2. षैः 3. तो 4. शा 5. सि 6. ऐ 7. मै
8. मत्पम (?)

1,2,3 ईरंपदापनेपतातस्याधस्तेतायंवतुसिरस्तोछिके॥ छरके॥ १७ पामोंजवे:कानाकुरोम
4,5 युक्तानीलाचमृत्तत्रसन्नार्कराचातसाप्तत्तंसुरसंचत्तायंक्रस्राथवापत्रवतिलमृको॥
6 १८ सत्राकुरोताप्रमहीकषायंत्राणंक्षरितीकपिलाकरोति।आपांडुरापालवणप्रदिष्ट
मिष्टपयोनीलवर्कुधरायां १९ इतिकूपस्यपरीक्षा: १ अथानादिनि:छातिमाह १ न्य
7,8 ग्रोधेन— —रका सिंदुकाहत्याचवछिकासवेत।अप्तछेनवविज्ञेयानि:छानि:सर्वेन
स्थानां २० जंबूलि:छलत्राखाशिरीषहत्याचमुत्रनि:छानि॥गोधूमाश्चप्रभूतेर्यवर
9,10,11 द्धि:सप्तधर्षेण २१ कारिणाग्रहस्निकोलेनर्देनृपाचाजिनोग्रकर्मेना।भाविद्युपाटला

1.स्त 2.स्तो 3.मौं 4.घ 5.रक्तमृद्वा (*according to Majumdar*) 6. र्के
7.'तु यवका' (*according to Majumdar*) 8.स 9.द्धि: 10. र्नि 11. गाव (?)

1,2,3 २० सिाकदलीसिरजाविकंसवति २२ आश्रे:छेनंसत्तातकेर्सर्पपीलुसिस्नथारोग्यांव
4,5 दिरसमी— —कंचार्जुनेगोलनावछि: २३ पिचुमंदनाउकुछाभेदुर्सिक्रमत्रानारुत
:कपित्थेनालिकुलेनाहछिसर्पव्याधिलपनेवसंसवति २४ इतिधरणिकहायुर्वेद।
6,7,8 मुघत्स्रतापप्रचवनरुपतिश्रीलीमपांलांतरंग॥अकुरुसुरपाल:कोतुकालिद्धयोऔ
9, 10 जगदमलपत्ना:श्रीवैद्यविद्यावरेणप॥ २५॥ ॥इतिवृक्षायुर्वेदासंपूर्ण ४ ४॥ ॥
कृपाराम कृ—शरण
कस्यपुस्तक निंदे॥१॥

1. भि: 2. ? 3. ल्ला 4.श 5.'भ्यां दुर्भिक्षमर्जुनै:' (*according to Majumdar*) 6.पा 7.रु 8.त सु 9. वें 10. :

Surapala's Vrikshayurveda

(Translated by Nalini Sadhale)

Introduction

Vrikshayurveda of Surapala, an ancient Sanskrit text on the science of plant life was a mere name until few years ago. The names of both the text and the author were preserved by tradition. The actual text, however, was unavailable.

Brhatsamhita of Varahamihira of the sixth century deals with widely ranging subjects such as astronomy, physics, geology, horticulture, archaeology, etc. It contains a chapter titled Vrikshayurveda. It also contains chapters on allied subjects such as divining groundwater, productivity and non-productivity of land as indicated by natural vegetation, etc. However, beyond establishing the antiquity of the *sastra*, it cannot give any definite clues to any full-fledged, independent texts on Vrikshayurveda. In the opening verse itself Varahamihira states, "After studying various *sastras* of the ancient sages and after being convinced about their authenticity, I propose to explain the same in a clear manner in this composition which is neither too brief nor too exhaustive" (Brhatsamhita Chapter 1, verse 2). This proves beyond doubt that the science of Vrikshayurveda was well developed even prior to the sixth century. Unfortunately, not a single text of that antiquity has been preserved.

An anthological compilation of Sarngadharapaddhati (written by Sarngadhara), belonging to the thirteenth century, is yet another ancient text which in its chapter "Upavanavinoda" deals with an allied subject, viz., "arbori-horticulture". The chapter brings under its fold such topics as planting, soil, nourishment of plants, plant diseases and remedies, groundwater resources, etc. Thus it shares with Vrikshayurveda of Surapala almost all the topics. Many verses are identical and several others, although worded differently have an identical content. The writer concludes the chapter with a note: "These are from different sciences about Vrikshayurveda." Thus like Varahamihira, he too, admits that his work is a compilation in which information from various texts on Vrikshayurveda is culled together. In spite of the striking resemblance between Upavanavinoda and Vrikshayurveda of Surapala, the former cannot be considered as a complete and independent text on Vrikshayurveda.

The hopes of tracing any independent text of Vrikshayurveda were given up by scholars. Thus Majumdar (1935) who has edited and translated Upavanavinoda says in his introduction, "The science of plant life, Vrikshayurveda, was a distinctly comprehensive science, a branch of which dealing with the construction and maintenance of gardens, is only referred to here. It is pertinent to enquire, where is this science—the Vrikshayurveda? It must have been there at one time, but it is, like the Dhanurveda or the science of archery and many other sciences, practically lost. A reconstruction at the present stage of our knowledge is out of the question...."

In their history of Sanskrit literature, Dasgupta and De (1947) refer to a Surapala while discussing the date of Subandhu, the author of Vasavadatta, a Sanskrit prose romance of the seventh century, but conclude that the reference is not sufficiently recognized and traced. Gray (1962), in his edition of Vasavadatta, refers to Surapala

only in the footnote of his translation as a reading accepted by some other editions. Evidently he translates the passage under discussion without any reference to Surapala but in the footnote, he adds, "The basis of the legend connected with him (i.e., Surapala) seems to be thus far unknown." Thus, tradition on one hand knew about a science called Vrikshayurveda and on the other hand also preserved the name of some legendary Surapala without having any evidence or means to establish his historicity. Surapala as a writer of Vrikshayurveda seems to be on the record of the history of ancient Indian medical science. Even in a brief survey of the literature Keith (1929) mentions his name.

It is on this background that Dr Y L Nene, Chairman, Asian Agri-History Foundation procured a manuscript of Vrikshayurveda of Surapala from the Bodleian Library, Oxford, UK. When it was shown to me, I gladly accepted to read and translate it for publication by the Foundation as a part of its program activities.

The manuscript is written in an old form of Nagari script. The present Nagari is developed from Brahmi through four or five stages. The script of the manuscript represents, most probably, the stage immediately preceding the modern form of Nagari. It uses a few characters such as *cha, na, tha,* and *bha* in their archaic forms. Joining of conjunct consonants is different in some cases as for *sva,* or for *kta,* etc.

The script consists of sixty pages with margin on both sides. Each page contains six lines in general (occasionally five or seven). There are about thirty characters in each line written boldly with a thick pointed pen.

The scribe has written the text neatly in a uniform hand. Some lapses such as careless deletion or addition of signs of *rkara, anuswara,* vowels, *halantas,* and *visargas* do exist. Occasionally, letters are omitted and *late* for *labhate* and *chineek* for *chinchineek* are used. Slips of pen such as *pavanaaya* for *vapanaaya, agnyamat* for *agnyanat,* and *jambru* for *jambu* occur but do not pose any difficulty in understanding the content. Duplicating a letter which is followed by *refa* as "*sarvva*" for "*sarva*", "*kurvvanti*" for "*kurvanti*", "*tarppan*" for "*tarpan*", and "*varjjayet*" for "*varjayet*" appears to be the special trait. Similarly, the scribe consistently uses anuswara (e.g., *vicharayantaha, santi, kaanchan, panchak, bhaand,* and *champak*) where the corresponding nasal consonants must be written as per the rule. Even when a nasal comes at the end of a line he uses *anuswara* and not the nasal consonant (verses 5, 7, etc.) although it is against the rules. The signs of *avagraha* are not used, e.g., *dinepachiyante* and *gulminontaralam.* Letters bearing a resemblance such as "*va*" and "*cha*", "*ya*" and "*pa*", and "*ta*" and "*na*" are not carefully and distinctively written. In spite of all these lapses, however, the scribe has succeeded in preserving for the posterity a complete text of Vrikshayurveda which can be sensibly read and comprehended by putting in some effort.

The text is in a verse form. Prose is used to conclude the preceding topic and commence a new one. There are 325 verses. Verses 184 and 202 are missing and a few lines of some verses are missing. The verses are composed mostly in the popular *anustubh* meter. More elaborate meters such as *upajati, vasantatilaka, mandakranta, vamsastha, puspitagra,* and *sardulavikridita* are also used for some verses. The work starts with a benediction and concludes with a colophon stating the name of the work as Vrikshayurveda, that of the author

as Surapala, and that of his patron as Bhimapala. It is a systematic composition starting with the glorification of trees and tree planting. It then proceeds to discuss various topics connected with the science of plant life such as procuring, preserving, and treating of seeds before planting; preparing pits for planting saplings; selection of soil; method of watering; nourishments and fertilizers; plant diseases and plant protection from internal and external diseases; layout of a garden; agricultural and horticultural wonders; groundwater resources; etc. The topics are neatly divided into different sections and are internally correlated. The author has expressed indebtedness to the earlier scholars but claims that in writing the present text he was guided by his own reason.

All these observations lead one to accept the text as an independent, full-fledged work on the subject of Vrikshayurveda. The following observations proved beyond doubt that such a branch of learning existed in ancient India:

- There are frequent references to this science in ancient Indian literature. It consists of works such as Atharvaveda, Brhatsamhita of Varahamihira, Sarngadharapaddhati of Sarngadhara, etc. which bring out the botanical and agricultural aspects; works such as the Samhitas of Caraka and Susruta which bring out the medicinal aspect; and works such as Grhyasutras, Manusmrti, Arthasastra of Kautilya, Sukraniti, Krishisangraha of Parasara, Kamandakiya Nitisara, Buddhist Jatakas, Puranas (Matsya, Varaha, Padma, Agni, etc.), and literary works (the Mahabharata, the Bhagavata, the classical poetry, and drama) which emphasize the economic, political, and socio-religious aspects. A subject so widely spread into so many branches of knowledge and so continuously preserved by tradition through a period spread over thousands of years must have a deep-rooted and firm foundation in the culture itself in the form of a systematic and independently developed branch of science.
- In this text, Surapala refers to several texts composed by many sages.
- Upavanavinoda, a chapter of Sarngadharapaddhati, also recognizes its indebtedness to several works on Vrikshayurveda.
- As early as in the sixth century, Brhatsamhita of Varahamihira refers to the expositions of his predecessors on various subjects including the present one. The chapter on Vrikshayurveda in Brhatsamhita which appears to be too brief must be an extract from a larger text.
- Majumdar (1935) stated that the students of medicine and agriculture had to study the science that existed in ancient India as a necessary part of their program.

In this light one can safely presume that the present manuscript represents one of the authentic texts of the lost science.

The colophon of the manuscript mentions Surapala as the writer of the text. He is described as a scholar in the court of Bhimapala, a "valorous" and "prominent" king. Surapala is stated to be "*Vaidyavidyavarenya*", a prominent physician. He is said to have earned reputation on account of "Siddhayogas" (perhaps title of some work). Like several other Sanskrit texts the

manuscript gives no clue to the date or place of the author. The subject deserves an in-depth study; however, any attempt at fixing a date of an author is bound to be at best a conjecture for want of definite proof. King Bhimapala, mentioned in the colophon as Surapala's patron, is known in traditional history as the son of Trilocanapala. However, there were two kings of that name belonging to the eleventh century, one who ruled Lata (Central Gujarat, India) and the other Punjab (in Pakistan).

The reference to "Siddhayoga" in an epithet describing Surapala in the colophon is open to several interpretations. An ayurvedic work "Siddhayoga" is ascribed to "Vrnda" (for which reason the work is also known as "Vrndamadhava"). If Surapala had gained fame due to this work, it could be by helping its propagation by writing a commentary on it. This is quite probable in view of the fact that Surapala was a prominent physician of his time. The above said "Siddhayoga" belongs to the fourteenth century and according to some scholars there is no difficulty in placing Surapala in that century. The reference under discussion uses plural for "Siddhayoga" which has to be explained for promoting the theory. Alternately, Surapala has to be credited with many texts on "Siddhayoga" himself. All this, however, would only be a guesswork.

Surapala's language, style, vocabulary, and expression also do not help much in providing any clue to his time or place. As for external evidence of Surapala's time, it is reasonable to expect his name to be cited in the other texts of Vrikshayurveda. In the absence of such texts, however, we have only the other two works which deal with the same topics. Between the two, Brhatsamhita is too ancient and Upavanavinoda does not mention him. Keith (1929) places him after 1300 AD. Sarngadhara's work (Upavanavinoda) at the most can be contemporary to it and it is difficult to expect Surapala to be cited in it.

Interestingly, it is in Subandhu's Vasavadatta—a Sanskrit prose romance of the seventh century—that we come across the name Surapala. In one of his punning allusions (Subandhu claims special credit for his double meaning expressions), while describing the Vindhya forest, Subandhu uses an epithet "*Surapalavrttimiva darsitaganikarikam*", meaning "the forest revealed (had in plenty) the trees named *ganikarika* (*arani* or the fire-producing tree of the Vedas, *Premna serratifolia* Linn., syn. *P. integrifolia* Linn.) just as (incidentally) Surapala's *vrtti* (brief commentary) too revealed *ganikarika*". In this superficial or verbal resemblance of Surapala with the forest he is said to have revealed, i.e., identified the tree *ganikarika*. This might be a reference to some Surapala who through his writings or commentary could throw light on the plant. At least, there is a reasonable ground to accept such a proposition. An ancient work on plants mentioning "*ganikarika*" may have existed on which Surapala might have written a *vrtti* and might have earned credit for identifying or throwing more light on the plant. Even though it is a reasonable conjecture, the reference must have been to some other Surapala of the seventh century. Besides the word "Surapala" can also be interpreted as "the ruler of the Gods—Indra" as has been done by some scholars. Many scholars, however, accept "Surapala" as a proper noun and translate the text accordingly adding a note that the reference to Surapala cannot be traced.

It is worthwhile to set aside the opinion which places Surapala in the fourteenth century in order to

solve the riddle of the common verses in the two texts. The theory for want of definite proof may be regarded as unproved.

It becomes possible then to give a serious thought to another theory putting Surapala in the tenth century. It can satisfactorily explain Sarngadhara's compiling in his work extracts from Vrikshayurveda, an authentic text on that science by a reputed scholar like Surapala. Any other theory which makes Surapala Sarngadhara's successor will be hard put to explain why a great expert in the science should borrow from compilations of his predecessors. "A prominent physician" under the patronage of a "great" king must do better than that to deserve the "spotless" fame and the tribute that tradition has paid to him by preserving his name through the centuries. In spite of these difficulties, the facts—that the science of Vrikshayurveda was well developed in ancient India, that Vrikshayurveda was also the name of an authentic text of that science, and that its author was Surapala—which were already accepted have been fully corroborated by the existence of the present manuscript.

The existence of the manuscript has solved some problems but it has also given rise to some new ones. The most important problems are:

- How does one explain the overwhelming resemblance between Upavanavinoda and the present text of Vrikshayurveda?
- If in Upavanavinoda Sarngadhara compiled extracts from several Vrikshayurvedas, then which extracts could be the portions of the science of Vrikshayurveda which Sarngadhara did not compile?
- Does the present manuscript provide any clue to it?

A comparison of the two texts, thus becomes essential. The third text, viz., Brhatsamhita also can be considered alongside as both the texts have borrowed material from it.

The starting point for such a comparison is obviously the scrutiny of the three texts with regard to the various topics they discuss (Table 1). Even such a superficial comparison of the three texts helps us to make the following observations:

- The topics are more exhaustive, systematic, and balanced in Vrikshayurveda than in the other two texts.
- Topics such as planting, nourishment, diseases and ailments, and treatment are most directly and vitally connected with the science of plant life. Vrikshayurveda treats them in the most exhaustive manner and thus, justifies its title. While Brhatsamhita treats these topics very briefly, Upavanavinoda too compares unfavorably with Vrikshayurveda.
- The basic principle of Ayurveda is the "*Tridhatu*" theory according to which a perfect balance of the three humors, viz., *kafa*, *pitta*, and *vata* signifies good health and any imbalance indicates lack of it among the human beings. If Vrikshayurveda is a science concerning the trees it should also, in order to justify its title, make the same "*Tridhatu*" theory applicable to the trees. Curiously enough Brhatsamhita which has a chapter "Vrikshayurveda" does not even refer to this theory. Upavanavinoda mentions it and makes it applicable to trees, but the treatment is

Table 1. Topics of verses in three Sanskrit texts.

	Vrikshayurveda		Upavana.[1]	Brhatsamhita[2]	
Topics	No. of verses	Verse nos.	No. of verses	No. of verses	Verse nos.
Benediction	–	–	–	–	–
Introductory composition	3	1–3	3	–	–
Glorification of trees	5	4–8	4	1	
Glorification of planting specific trees	15	9–23	16	–	–
Merits and demerits of trees planted around the house	11	24–34	10	4	85–88 (ch. 53)
Soil	10	35–44	9	4	2, 3, 10, 11 (ch. 55)
Classification of plants and multiplication	7	45–51	7	–	–
Seed	7	52–58	4	–	–
Sowing	4	59–62	3	–	–
Planting	34	63–96	14	8	4–8, 12, 13, 31 (ch. 55)
Protection of plants	4	97–100	6	–	–
Nourishment	64	101–164	34	1	9 (ch. 55)
Dangers, diseases, and ailments of plants, and treatment[3]	56	165–222	20	3	14–16 (ch. 55)
Horticultural wonders	70	223–292	37	14	17–30 (ch. 55)
Pleasure gardens	8	293–300	11	1	1 (ch. 55)
Groundwater	19	301–319	53	125	1–125 (ch. 54)
Suitability or otherwise of land for crop and animal production as indicated by natural vegetation	5	320–324	6	14	1–14 (ch. 29)
Colophon	1	325	–	–	–
Total	323		237	175	

1. Upavana. = Upavanavinoda.
2. ch. = Chapter no.
3. In Vrikshayurveda, there are 19 verses (nos. 165–183) on dangers, diseases, and ailments of plants and 37 verses (nos. 185–201, 203–222) on treatment.

inexhaustive and unsystematic with the symptoms and remedies mixed-up. It is only in Vrikshayurveda of Surapala that we find a more satisfactory application and a systematic exposition of the "*Tridhatu*" theory as applied to the plants.

- The topic of groundwater receives an exhaustive treatment in Brhatsamhita and both Vrikshayurveda and Upavanavinoda have borrowed verses from it or made use of the contents in their respective texts. However, being primarily concerned with plants, Surapala finds it sufficient to expound the topic in seventeen verses only.

- From the title one would expect a very exhaustive description of laying out pleasure gardens in Upavanavinoda. But it has treated the subject almost in the same number of verses as in Vrikshayurveda.

- Vrikshayurveda surpasses the other two texts very widely in describing horticultural wonders.

- The topics are scattered in four chapters in Brhatsamhita without any attempt on the part of the compiler to correlate them. Thus, "Granthopanayana" (Chapter 1) contains general introduction to all the subjects including Vrikshayurveda.

- "Kusumalata" (Chapter 29) in Brhatsamhita deals with implications of natural vegetation (it is not very clear why the chapter is named "Kusumalata"). Both Upavanavinoda and Vrikshayurveda deal with this topic briefly towards the end.

- "Vastuvidya" (Chapter 53) in Brhatsamhita deals with the science of constructing a house in 125 verses out of which about four or five deal with the trees to be planted around the house. Both Upavanavinoda and Vrikshayurveda deal with it fairly exhaustively in the beginning of the texts.

- "Udakargala" (Chapter 54) in Brhatsamhita deals very exhaustively with the subject of groundwater resources in as many as 125 verses, while the other two texts treat the subject briefly.

- "Vrikshayurveda" (Chapter 55) in Brhatsamhita deals briefly with planting, soil, nourishment, diseases and ailments, treatment, and a few horticultural wonders in 31 verses. Both the other texts discuss these topics in detail.

If in the above light we address ourselves to the earlier questions which necessitated this comparison we can answer them as below:

- The resemblance between Upavanavinoda and Vrikshayurveda may be explained by either proposing a theory that both have made use of texts of their predecessors or by revising our opinion regarding Surapala's date. Unless we ascribe to him an earlier date and make him Sarngadhara's predecessor so as to enable the latter to take extracts from Vrikshayurveda for his compilation, we cannot satisfactorily explain how the two works contain more than seventy to eighty identical verses, and perhaps an equal number of those which are worded differently but have identical content.

- The science of Vrikshayurveda must have texts dealing more exhaustively with plant diseases and they must also have a more detailed treatment of the "*Tridhatu*" theory as made applicable to the plants. Topics such as plant morphology and plant

anatomy might have found place in the science too. In the absence of more texts on the subject it is possible only to venture such a guess.

- The present manuscript definitely indicates that the application of the "*Tridhatu*" theory to plants and providing more recipes for producing horticultural wonders must have been the lines on which the *sastra* must have developed.
- It is not possible to answer these questions more satisfactorily until some more texts on the science are discovered.

Surapala's merits as an author of a scientific work have been brought out incidentally in course of these discussions. Thus a systematic unfolding of the subject, a balanced treatment of various topics, neatly divided sections for the respective topics with clear demarcations of commencement and conclusion, a better and more logical expounding of various topics as compared with the other two texts, regard for predecessors combined with self-confidence and independent reasoning are some of the characteristics of his writing. Although in a work of this nature what is said is more important than how it is said, the writer in any field must have the essential language skill to express himself precisely and effectively. There is often a danger of the writer erring on the other side and oversimplicity, plainness, and banality in expression result. It must be said in favor of Surapala that his language is happily free from these traits. Throughout, he shows a full command on language illustrating its flexibility which characterizes the Sanskrit language. He uses the highly developed and refined form of language used in the classical literature. It is simple and lucid. Compound words are used but they do not hamper the flow of expression. The contents of the work do not give much scope for literary embellishments. However, in the description of the blossoming of some trees at the loving glance or a gentle kick of a charming young girl (as per conventions in literature), Surapala's poetic talent reveals itself fully and can match with the best of the classical poetry in Sanskrit (verses 147–151). Similarly, when he describes the plan and layout of a pleasure garden (verses 293–297), the poet in him automatically takes charge of his pen.

Surapala has also expressed the most ordinary content in a poetic manner. Thus, he uses three beautiful comparisons for the colors and yet another for the softness—a soft soil of blue, white, or yellow tinge is good for planting (verse 38). One has to read it in the original to fully appreciate the beauty of expression. Verses 118, 119, 129, 134, 140, 153, 248, and 249 also illustrate this ability of the author. Occasionally he uses simple figures of speech like alliteration and simile. However, all these graces of language come to him without effort. His skill in using difficult and elaborate meters is also noteworthy. Brevity and precision of expression is yet another asset of the author. Thus in this respect, too, Surapala's work can claim superiority to the other two texts.

The Science of Plant Life

Salutations to Lord Ganesha.

Introductory composition

1. He is (rightfully called) the Lord of the earth in whose palace there are extensive gardens:

- which provide people with an important means of all happiness, viz., mutual conversation;

- which give immense pleasure to the minds of wanton women proud of their charm and longing for enjoyment;

- which are provided with extensive, delightful oblong ponds with bees hovering around the fully bloomed lotuses (in them).

2. Youth, attractive physique, beautiful women, talented friend, music of a melodious tune, woods, everything is meaningless for a king longing for happiness, in the absence of pleasure gardens.

3. After studying the scientific works of the sages I have expounded (here in this book) the very same import although using my own reason in coordinating them and have not stated anything of my own. Keeping this in view, let gentlemen read my writing and derive joy (from it) which is so natural to them.

Importance of trees

4. What is the use of several trees grown in the forest, or sons who do not serve the purpose of *dharma* or *artha*? (Instead,) a single tree by the wayside is far better whereunder people can rest.

5. (Planting) five trees is far better than (giving birth to) ten sons (as the former) offer libations to the father (planter) with leaves, flowers, and fruits.

6. Ten wells are equal to one pond. Ten ponds are equal to one lake. Ten lakes are equal to one son. Ten sons are equal to one tree.

7. And if one plants a pleasure garden abounding in boundless fruits (yielding many rewards), (then) gods, wise men, nymphs, yakshas, etc., reside there for three ages.

8. Knowing this truth one should undertake planting of trees since trees yield the means of attaining *dharma*, *artha*, *kama*, and *moksha* (the four aims of life).

9. A person is honored in *Vaikuntha* (Heaven) for as many thousand years as the days he resides in a house where *tulasi* is grown.

10. And if one properly grows *bilva*, which pleases Lord Siva, in his family, the goddess of riches resides permanently passed on to the sons and grandsons.

11. He who plants even a single *asvattha*, wherever it may be, as per the prescribed mode, goes to the abode of Hari.

12. He who has planted *dhatri* has performed several sacrifices. He has donated the earth. He would be considered a celebate forever.

13. He who plants a couple of banyan trees as per the prescribed mode would go to the abode of Siva and many heavenly nymphs will attend upon him.

14. After planting neem trees a person well-versed in *dharma* attains the abode of the Sun. Indeed! He resides there for a long period.

15. By planting four *plaksa* trees a person doubtlessly obtains the fruit of Rajasuya sacrifice.

16. He who plants five or six mango trees attains the abode of Garuda and lives happily forever like gods.

17. One should plant seven *palasa* trees or even one. One attains the abode of Brahma and enjoys the company of gods by doing so.

18. He who himself plants eight *udumbara* trees or even prompts someone to plant them, rejoices in the lunar world.

19. He who has planted *madhuka* has propitiated Parvati, has become free from diseases, and has worshipped all the deities.

20. If one plants *ksirini, dadimi, rambha, priyala,* and *panasa,* one experiences no affliction for seven births.

21. He who has knowingly or unknowingly planted *jambu* is respected as a recluse even while staying in the house.

22. By planting all kinds of other trees, useful for fruits and flowers, a person gets a reward of thousand cows adorned with jewels.

23. By planting one *asvattha,* one *picumanda,* one *nyagrodha,* ten tamarind trees, the group of three, viz., *kapittha, bilva,* and *amalaka,* and five mango trees, one never visits hell.

Merits and demerits of trees planted near the residence

24. *Nyagrodha* to the east of the house fulfills all wishes. Similarly *udumbara* to the south and *pippala* to the west are auspicious.

25. *Plaksa* is desirable to the north. Nonconformity with these (directions) should be avoided.

26. Avoid planting *asvattha* to the east, *plaksa* to the south, *nyagrodha* to the west, and *udumbara* to the north of the house.

27. Gods, demons, *gandharvas,* ghosts, snakes, rakshasas, beasts, birds, and human beings always take resort to the trees.

28. Shadow of no tree of any kind should fall on the house. Even a gold-yielding tree should not be planted at the entrance of the house.

29. The house where *badari, kadali, dadimi,* and *bijapuraka* are grown does not grow (prosper).

30. *Eranda, kancanara, slesmataka, arjuna,* and *karanja* must not be grown in the vicinity of the house of a happy man.

31. Thorny plants in the vicinity cause danger from enemies. *Ksirini* plants planted close by result in loss of wealth. Although fruit-yielding, it is better to avoid them as they cause loss of progeny. Even their wood should be avoided (in the construction of the house).

32. A person planting *nili* and *haridra* will always meet with loss of progeny and prosperity. Even when these

sprout out of their own accord (naturally), they should be uprooted by the wise, following the advice of the sages.

33. One should not plant a garden to the south, southwest, or northeast of the house as it leads to quarrels, distress, and adversity.

34. Therefore, west, north, and east are the proper directions for planting gardens near the house. It is auspicious for a king and he is rewarded with progeny.

Soil

35. Arid, marshy, and ordinary are the three types of land. It is further subdivided into six types by color and savor.

36. Black, white, pale, dark, red, and yellow are the colors and sweet, sour, salty, pungent, bitter, and astringent are the tastes by which land is subdivided.

37. Land with poisonous element, abundance of stones, ant hills, holes, and gravel and having no accessibility to water is unfit for growing trees.

38. Bluish like saphire, soft like a parrot's feather, white like conch, jasmine, lotuses, or the moon, and yellow like heated gold or blooming *champaka* is the land recommended for planting.

39. Land which is even, has accessibility to water, and is covered with green trees is good for growing all kinds of trees.

40. Arid and marshy land is not good. Ordinary land is good as all kinds of trees grow on it without fail.

41. *Panasa, lakuca, tala*, bamboo, *jambeera, jambu, tilaka, vata, kadamba, amrata, kharjura, kadali, tinisa, mrdvi, ketaki, narikela*, etc. grow on a marshy land.

42. *Sobhanjana, sriphala, saptaparna, sephalika, asoka, sami, karira, karkandhu, kesara, nimba*, and *saka* grow well on an arid land.

43. *Bijapuraka, punnaga, champaka, amra, atimuktaka, priyangu, dadima*, etc. grow on an ordinary type of land.

44. If wealth, destiny, and the king are favorable any tree can grow anywhere with special effort.

Propagation

45. *Vanaspati, druma, lata*, and *gulma* are the four types of plants. They grow from seed, stalk, or bulb. Thus the planting is of three kinds.

46. Those which bear fruits without flowers are *vanaspati* (types). Those which bear fruits with flowers are *druma* (types).

47. Those which spread with tendrils are *lata* (types) (creepers). Those which are very short but have branches are *gulma* (types) (bushes).

48–49. *Jambu, champaka, punnaga, nagakesara*, tamarind, *kapittha, badari, bilva, kumbhakari, priyangu, panasa, amra, madhuka, karamarda*, etc. grow from seeds. *Tambuli, sinduvara, tagara*, etc. grow from stalks.

50. *Patala, dadimi, plaksa, karavira, vata, mallika, udumbara, kunda*, etc. grow from seeds as well as from stalks.

51. *Kumkuma, ardra, rasona, alukanda*, etc. grow from bulbs. *Ela, padma, utpala*, etc. grow from seeds as well as from bulbs.

52. Seed is extracted from dried fruits which become ripe in the natural course and season. It is then sprinkled

with milk and dried for five days. It is then smoked with mustard seed mixed with *bidanga*.

53. Seeds sprinkled with milk, smeared with mustard and ash of sesame and *brhati*, rubbed with cow dung, and smoked with marrow sprout in no time.

54. Seeds sprinkled with milk, rubbed with cow dung, dried and profusely smeared with *maksika* (honey) and *bidanga* definitely sprout.

55. According to the experts, seeds soaked in milk, dried well in shade, and rolled into powder of *brhati, tila*, and *nala* (hollow stalk of lotus) mixed with mustard are also excellent for sowing.

56. The seeds of *makanda, jambu*, and *panasa* are excellent when wet and treated as stated above. The seeds of *ksirika* and *bakula* are good when dried and treated as stated above and when the tips are cut (or bent).

57. The seeds of *urvaru* become fit for sowing when sprinkled with water mixed with plenty of jaggery tied in a leaf-vessel, put on the ground, heated incessantly with fire for three days and then taken out.

58. Seeds which are treated and preserved in this manner are all good for use. Trees grown from such seeds bear forever abundant flowers and fruits of an excellent quality.

59. The owner of the farm should wear clean clothes after bath, worship God, offer salutations to his preceptors, offer wealth or land to the worthy, offer salutations to the *vastu* deity (superintending deity) and then (he) himself should sow some seeds. The servants should then follow him.

60. After sowing, the seeds should be covered with grass and sprinkled with water mixed with milk. Water should be sprinkled after they sprout. Grass should be removed and the soil should be allowed to dry.

61. The first day of the bright fortnight, fullmoon day, the fifth or the thirteenth day (of the bright fortnight) are good for sowing. Monday, Wednesday, Thursday, and Friday are good days.

62. *Visakha, Mrga, Mula, Citra, Uttara, Uttarasadha* and *Uttarabhadrapada, Anuradha, Jyestha*, and *Krttika* are good stars. Steady *Lagna* is good.

Method of planting

63. The seedling then should be planted in beautiful, even ground, on which sesame or black gram is not grown earlier and which is strewn over with heaps of flowers.

64. The distance between two plants is fourteen, sixteen, or twenty forearm lengths. These distances result in inferior, mediocre, and excellent yield of trees respectively.

65. Distance between two bushes should be four or five forearm lengths. *Puga*, etc. are planted carefully at a distance of two to three forearm lengths.

66. If planted at farther distance there is the danger of strong winds. But if planted closer than this (2-3 forearm lengths) there is no yield. So one should strictly adhere to the correct distance for proper yield from the trees.

67. The pits should be prepared well in advance. The length, breadth, and the depth of the pits should be a forearm measure uniformly. They should be properly dried, filled with cow bones and cow dung, and burnt.

68. After the ash is naturally cooled and removed, *kunapa* water (liquid manure) should be sprinkled and the pits should be filled with good earth.

69. Sowing seeds for *makanda, dadima, kusmanda,* and *alambuka* is good but planting is even better.

70. In the fertile lands which are used excessively, seeds of *trapusa* or of other vegetables are sown intermittently.

71. Here (in these fields), saffron, *maruwaka,* and *damanaka* are similarly grown in a small carry.

72. Large seeds should be sown singly but smaller ones should be sown in multiples. The seed of *naranga* should be sown in a slanting position with hand.

73. The seeds of *phanijjhaka* (*maruwaka*) should be mixed with earth and then water mixed with cow dung should be sprinkled gradually and gently.

74–75. Smeared with the pulp of a plantain ripened naturally and dried in the sun, a rope of the stalk of *sastika* (a rice variety that matures in 60 days) should be laid in the pits intermittently. Sprinkled with little water continuously in the hot days, it yields without fail sprouts blue like *tamala*.

76. The stalk should be eighteen *angula*, not too tender nor too hard. Half of it should be smeared with plenty of cow dung and then (it) should be planted with three-fourth part in the pit and should be sprinkled with water mixed with soft sandy mud.

77. The lower part of the stalks of *satapatrika* should be half-ripened and then in the month of *Kartika* (postrainy season) should be planted in a carry and drenched with water for about two months.

78. When they are covered with leaves they should be uprooted and transplanted wherever desired in the month of *Asadha* (beginning of rains).

79–80. The branches of *dadima* and *karavira* should be bent and planted applying enough cow dung at the root. They should be watered regularly for two months. After the leaves start growing they should be cut in the middle.

81. Bulbs should be planted in pits measuring one forearm—length, breadth, and depth—and filled with mud mixed with thick sand.

82. *Kadali* should be planted after smearing the root profusely with cow dung. It should be planted in the pit along with the root and should be watered well.

83. Small trees should be transplanted by day time at the proper directions when they are one forearm tall. The roots should be smeared with honey, lotus-fibre, ghee, and *bidanga* and then planted in proper pits along with the earth.

84. Big trees should be similarly transplanted with their roots covered during evening after reciting the following mantra the previous day.

85. "Oh tree, I shall take you to a better place from here and shall water you in such a way that you shall be satisfied."

86. "You will grow there and shall have no fear from lightning, etc. I shall look after you there, like a dear son."

87. *Ksirika, tuta, dadimi, bakula,* etc. should be planted in the month of *Sravana* (midst of rainy season). *Rajakosa, amra, lakuca,* etc. should be planted in the month of *Bhadrapada* (when rains are receding).

88. *Golla, vartaka*, etc. should be planted in the month of *Asvina*. *Phanijjhaka, satapatrika, dhanyaka, mulaka*, etc. should be planted in the month of *Kartika*.

89. *Patola*, etc. should be planted in *Phalguna* (beginning of spring) and *kakaraka*, etc. in *Caitra* (spring). A wise man should plant *kadali*, etc. in the month of *Vaisakha* (beginning of summer) and on a Friday.

90. Any tree as desired can be planted in the month of *Asadha*. *Margasirsa, Pausa*, and *Magha* (winter, i.e., coolest periods) are stated to be bad for planting.

91. A wise person should plant *bhillota* (*bhallataka* ?) without fail on all sides of all the trees for ensuring their health.

92. *Phalini, asoka, punnaga, sirisa*, and *nimba* must be planted first as they are auspicious and also prevent diseases and calamities.

93. *Karamarda* and *vamsa* to the east, *paravata* trees to the south, *badari, kapittha*, and *dhatri* to the north are auspicious. Other trees having fibrous (or flexible) roots and of good, mediocre, and bad categories also should be planted on the border along with the trees of the same category at regular intervals.

94. The designs for planting trees are: *mandapa* (canopy), *nandyavarta* (quadrangle with an opening to the West), *swastika* (famous diagram of religious significance), *caturasra* (square), *sarvatobhadra* (a square enclosing a circle), *vithi* (line), *nikunja* (arbour), and *punjaka* (multitude, cluster).

95. The fruit-yielding and flower-yielding trees should be at the center and other trees around them. They should be planted in pairs and they too, should be encircled by a trench.

96. Thus after knowing this technique the person concerned with trees should undertake planting after propitiating gods and preceptors and after removing all impurities.

97. Trees alone on the earth give happiness both here and hereafter. Since they "save" from abject poverty they are named "*taravah*" (the saviors).

98. Therefore, the trees should be carefully nurtured as through their shade, flowers, and fruits they help immensely in the pursuit of *dharma, artha*, and *kama*.

99. Trees must be protected vigilantly from mist, storm, smoke, fire, and spider.

100. An expert should treat the plant by coating with sesame oil cake and *bidanga*—the insecticide—by sprinkling mixture of milk and water and the liquid fertilizer (*kunapambu*), and by smoking with ghee.

Nourishment

101. The excreta, marrow of the bones, and flesh, brain, and blood of a boar mixed with water and stored underground is called *kunapa*.

102. As per the availability the fat, the marrow, and the flesh of fish, the ram, the goat, and other horned animals should be collected and stored.

103. These should be boiled after mixing with water, and the mixture should be stored in an oiled pot after adding sufficient quantity of husk.

104. After roasting it in an iron pot, sesame oil cake and honey should be added. Soaked black gram of good quality should also be added. A little ghee should then be poured.

105. The items stated above should be taken at random as there is no measure for anything. One by one it should be placed in the pot in a warm place by a competent person.

106. This *kunapa* is highly nourishing for the trees. This is as stated by the ancient sages and I (Surapala) repeat it here after verifying the same.

107. For the growth of a young sapling a cold mixture prepared out of fish, flesh, and sesame should be given every seventh day.

108. So long as the color of their foliage is not similar to that of the coral, newly planted trees should be protected from the sun.

109. Newly planted trees in arid land should be watered every morning and evening for a period of fifteen days until the soil is fully soaked.

110. In marshy land, watering should be restricted to only once in five days. In ordinary soil, watering should be done for ten days every morning and evening, the quantity of water being limited.

111. Well-rooted plants should be watered every alternate day in winter, every evening in spring, and thrice a day in summer.

112. In the rainy season and autumn or when the soil becomes dry, juice of medicinal plants mixed with urine, marrow, and milk should be given.

113–114. The *kunapa* water, the excreta, and flesh are the ingredients to be mixed with water previously treated with fermenting seed for trees to produce flowers and fruits in abundance.

115. A discerning person should weed out all the grass growing in the vicinity and should dig it out from near the roots of the trees with a spade.

116. The trees give extreme satisfaction by their fruits and flowers when rendered free even from suspicion of impurity by subjecting them to the treatment of smoking by the mixture of white mustard seeds, flowers of the *arjuna* tree, and flesh of the hare added to a combination of antiseptic (*bidanga*) and turmeric powder.

117. The trees yield rich reward in the form of flowers and fruits in a very short period when smoked with the mixture of plantain leaves, white mustard seeds, and a small, shining variety of fish.

118. The trees bear abundant fruits and flowers quickly if watered with the mixture of marrow of stag and hog, honey, ghee, and tender leaves of *nicula*.

119. Trees which are smoked heavily by a mixture of ghee, *bidanga*, milk-water, and honey become full of flowers and fruits in a short time.

(A part of the verse is unintelligible.)

120. All the creepers bear flowers and fruits in abundance when watered by a mixture of the marrow of python and *dhammina* snake.

121. A creeper bears fruits and flowers when pierced with a sharp instrument (literally, with a sting of a scorpion), smoked with the fat of *saphari* (a tiny, shining fish), and sprinkled with the marrow of a hog and mouse.

122. The grape creeper bends down with flowers and fruits if the roots are nourished with powdered excreta of cocks and sprinkled with water mixed with fish fat.

123. The mango trees are nourished well and are loaded with sweeter and bigger fruits if treated with water mixed with ripe fruits of *ankolha*, ghee, honey, and marrow of a boar.

124. The trees of the coconut type (palm, betel nut, *kataka*, and date) bear fruit if watered by the decoction of the flesh of cow, hog, and Gangetic porpoise and if manured with the powder of the *saphari* fish mixed with sesame.

125. The coconut trees become loaded with weight of huge fruits and also become free from disturbance if smeared at night with extracts of fermented liquor, sesame, black gram, and wine, mixed with honey, salt, and *bidanga* (an insecticide).

126. Coconut trees always produce fruits as big as pots if they are treated with soup of black gram, salt water, powder of barley, or husk-water in abundant quantity.

(A word in the verse is unintelligible.)

127. Water mixed with white mustard, barley, husk, and oil cake nourishes trees of the type of breadfruit, date, and *kamala*.

128. The pomegranate trees produce fruits with bigger, sweeter, and juicier seeds of a bigger variety when they are profusely watered with milk of the buffalo mixed with the flesh of a cat, a blue jay, deer, elephant, and boar, and plenty of marrow.

129. When properly saturated with the treatment of being manured with lumps of flesh of the fox mixed with the flesh of cattle and when its basin is filled with water mixed with crystalline sugar, the pomegranate tree bends down with fruits extremely sweet and full of abundant juice.

130. When its trunk is smeared with honey fully dissolved in fresh ghee and *saphari* fish and when smoked with the powder of *triphala* mixed with ghee, the pomegranate tree bears fruits of bigger size.

131. When saturated with fish-water and earthworms treated with milk, the pomegranate tree produces sweet and big fruits.

132. The pomegranate tree, when bent with fruits is ornamented with the skull of the blue jay. So also the *amrata* tree is decorated on the top with the ring of the neck of an earthen jar. (This appears to be some sort of an esoteric remedy for protecting the fruits.)

133. Watered with plenty of *triphala* decoction and covered immediately with husk, the jackfruit tree bears many fruits of a bigger size, very sweet and without seeds.

134. *Kola*, when watered profusely with the mixture of *yastimadhuka*, sesame, and honey and also with *kunapa* at the root bears fruits which are attractive, as big as the *bilva* fruits and with flavor and taste like nectar.

135. *Karkandhu*, *lakuca*, *badari*, *dhatri*, and *jambu* trees when smeared with a mixture of ghee, honey, *krsara* (spiced food preparation with sesame, rice, and peas), and *lodhra*, enriched with the thick paste of barley or when smeared and smoked well with sesame, honey, and barley for twelve days, and watered with milk-water at blossoming time bear good fruits.

136. Similarly when the above mentioned trees are amply watered and sprinkled with wine everyday, they bear fruits of big size with nectar-like taste.

137. The *bilva* and the *kapittha* trees when sprinkled with mixture of jaggery, ghee, milk, and honey bear plenty of juicy fruits.

138. The plantain trees bear many fat fruits when covered fully at the offshoots of the roots by plenty of ash of rotten straw and cow dung and when watered with *kasa* and flesh-water.

139. *Tinduka* trees are fed well with the water of rice and black gram, and *paravata* trees bend down with fruits when nourished with the extract of neem leaves.

140. The *matulungi* when fed well with the fermented water mixed with milk, flesh, fish, cow dung, rice, and with the thick water of sesame cake bends down with fruits which are extremely sweet, soft, fleshy, and big like a jar.

141. The *bijapuraka* bears fruits when watered with a mixture of minced flesh of the fox and the orange trees bear good quality fruits when fed with water mixed with flesh, jaggery, and milk.

142. Orange trees bend down with fruits when fed with plenty of water mixed with *bidanga*, black gram, sesame, mustard, and *bilva* along with water mixed with turmeric powder and the flesh of the rabbit, and when smoked with the rabbit flesh.

143. The *madhuka* trees bear flowers which are fragrant like camphor-dust when smoked well with big lumps of flesh, mixed with *kalaya* (a sort of pulse) and powdered bark of *ankola* and treated with the fibrous roots and leaves of *jalini*.

144. *Sauvira* is nourished well with curd, hog fat, and sesame mixed with country liquor, while *ksirindika* (*ksirika* ?) is nourished with *kunapa* water. The *syama*, the *kadamba*, the *karikesaraka* bend down with branches of fragrant flowers (with the same treatment).

145. All flowering plants blossom profusely when watered with the decoction of tender leaves of *jantu*, *khus*, and *musta* mixed with liquor.

146. *Ketaki* blossoms richly when watered well with the fragrant things like cardamom and when fed with decoction of flesh.

147. *Ketaki* blossoms well when nourished with excreta water. The *bakula* tree blossoms well when sprinkled with mouthful of wine by a beautiful (young) lady.

148. *Makanda* tree gets horripilation in the form of buds when it is scratched by a beautiful woman with the tips of her nails and also when scratched by the tips of the *kuvara* (?).

149. *Asoka* tree yields rich blossom when kicked by a lady who on account of her beauty is like the banner of love-god, gracefully and gently with her lotus-like foot painted deep red with lac dye and adorned with lovely anklet jingling melodiously.

150. The *kurabaka* and the *tilaka* trees yield rich blossom when embraced all around by a charming lady with her graceful creeper-like arms looking beautiful like the lotus stalks and adorned with dangling bracelet.

151. The *syama* creeper blossoms when wedded to the nearby tree after being decorated like a bride and after the pre-marriage bridal rituals are performed.

152. *Madhavi*, *karavira*, and *kuranta* bear rich blossoms when religiously sprinkled with wine at the time of sunset.

153. *Malli(ka)* produces abundant flowers when slightly fomented with the shaking flames of hay-fire, and *patala* (blossoms so richly that it) becomes the sole resort of the bees when profusely fed with water mixed with milk.

154. The cotton plant when sprinkled with water mixed with fish flesh, *yuthi* when fed well with the water mixed with milk, sesame, and dry cow dung, and the *saptachhada* as also the *sephalika* when fed well with water mixed with flesh and enriched with fish flesh yield better blossoms.

155. The vegetables of the type of *birbhati, alambu* (pumpkin), *karkaru, trapusa,* etc. produce rich yields when smoked in summer with the bones of hog.

156. The *alambuka* bears many fruits in a short period if watered with stale rice-water (starch).

157. *Patola* (pointed gourd) plants when stressed in the month of *Phalguna* (spring, usually February/March) with the flames of hay-fire and profusely sprinkled with water mixed with oil cake in *Caitra* (after *Phalguna*) yield gourds.

158. Trees should be provided with the warmth by dusting fire-ashes tied in a piece of cloth to eliminate the ill-effects of frost.

159. If cooked rice mixed with curd is sprinkled all over in the farms the hail shower can be immediately warded off.

160. If the farm is infested with rats, etc. the following mantra written on the plantain leaf with lac dye should be kept at the center of the field in a triangle.

161–162. *Om Swasti*! (Let peace prevail!) The Lord Hanuman from Kiskindha, whose feet are ever victorious, who has displayed his valor in great disasters and by capturing the Sun, who is the Lord of lords, commands the rats, the shrews, grasshoppers, etc. in this particular land, "Leave this land and go elsewhere immediately on seeing this order of the king, otherwise the king will use his tail, powerful like the thunderbolt, to kill, burn, and destroy all of you. *Hum*! *Phat*! *Swaha*!"

163. After writing this *mantra* on a leaf and having recited it, the leaf should be buried in the ground. This will destroy all sparrows, insects, kites, rats, ants, etc.

164. Thus when these various well-proven rituals are practiced on all the superior, medium, and the inferior trees, including saplings, plants, or fully grown trees, they systematically and completely destroy (the above stated nuisances).

Ailments

165. The disease of all types of trees is stated to be of two varieties: internal and external.

166. The internal ones are those which are caused by *vata, pitta,* and *kafa* (humors); and external ones are those which are caused by insects, cold weather, etc.

167. Among these, the diseases caused by *vata* are due to the land that becomes arid on account of excessive supply of dry and pungent matters.

168. These diseases are: thinness and crookedness of trunk, appearance of knots on the trunk or leaves, and the fruits being hard, with less juice and less sweetness.

169. The diseases of the *kafa* type occur in winter and in spring if the trees are excessively watered with materials which are sweet, oily, sour, or cold.

170. These diseases are: taking long time to bear fruits, paleness, dwarfing of leaves, tastelessness, and prematurity of fruits.

171. The diseases of the *pitta* type occur at the end of summer if the clouds disappear and the trees are excessively watered with materials which are bitter, sour, salty, and strong.

172. These diseases are: yellowness of leaves; untimely dropping of fruits; dryness; paleness of leaves, flowers, and fruits; and decay.

173. If the trees are exposed to scorching heat, the roots are eaten away by insects and result in drying, yellowness, and excessive paleness of leaves.

174. Excessive stormy winds cause stress and result in breaking, uprooting, and twisting of the trees. The break is of two types—one when the branches remain attached and the other when they fall off.

175. The trees dry up due to exposure to fire or lightning, as well as due to the aridity of the soil and absence of water.

176. When struck with an axe, etc. the trees are wounded and there results dryness of all types of trees.

177. Due to the imbalance of the *kafa* element, the trees ooze out even without wounds. If wrong treatment is given corresponding diseases of the *vata* type result.

178. Due to those (*vata* type of diseases) day by day the trees lose their leaves, flowers, and fruits. The same results occur due to excessive watering, exposure to heat, or due to the wrong type of soil and unfavorable season.

179. The imbalance of these elements, viz., *vata*, *pitta*, and *kafa* enhances the disease of jaundice (yellowing). Trees affected by that disease have their trunks, fruits, and leaves turned yellow.

180. An imbalance in the elements, viz., *vata*, *pitta*, and *kafa* develops due to faulty seed, lack of treatment, and wrong treatment and renders all the trees unproductive.

181. Due to the attack by ants and due to the indigestion caused by excessive water the trees suffer from bad smell, lack of original fragrance, and dwarfing of leaves and sprouts.

182. Fire, wind, friction with other trees, constant existence in shade, inhabitation by too many birds, excessive growth of creepers and growth of weeds nearby—all these destroy the trees.

183. In this manner, various diseases of trees should be diagnosed by the above-stated respective indications and treatment should be given by one whose industry is guided by superior intelligence.

184. (Verse is missing.)

Treatment

185. Diseases caused by imbalance of *vata* can be cured by flesh, marrow, and ghee. The sprinkling of *kunapa* water also removes all the disorders caused by the *vata* element.

(A quarter of the verse is missing.)

186. The diseases of the *vata* type can be quickly warded off by liberal fumigation of the mixture of the fat of the hog, oil of the Gangetic porpoise, ghee, hemp, hair of the horses, and cow's horn—boiled and set to a decoction.

187. The diseases of the *kafa* type can be overcome with bitter, strong, and astringent decoctions made out of *panchamula* (roots of five plant species—*sriphala, sarvatobhadra, patala, ganikarika*, and *syonaka*) with fragrant water.

188. For warding off all *kafa* type of diseases, the paste of white mustard should be deposited at the root and the trees should be watered with a mixture of sesame and ashes.

189. In case of trees affected by the *kafa* disease, earth around the roots of the trees should be removed and fresh, dry earth should be replaced for curing them.

190. A wise person should treat all types of trees affected by the *pitta* type of diseases with cool and sweet substances.

191. When watered by the decoction of milk, honey, *yastimadhu*, and *madhuka*, trees suffering from *pitta* type of diseases get cured.

192. Watered with the decoctions of fruits, *triphala*, ghee, and honey the trees are freed of all diseases of the *pitta* type.

193. To remove insects both from the roots and branches of the trees, wise men should water the trees with cold water for seven days.

194. The worms can be overcome by the paste of milk, *kunapa* water, and cow dung mixed with water and also by smearing the roots with the mixture of white mustard, *vaca, kusta*, and *ativisa*.

195. The worms accumulated on trees can be treated quickly by smoking the tree with the mixture of white mustard, *ramatha, vidanga, vaca, usana*, and water mixed with beef, horn of a buffalo, flesh of a pigeon, and the powder of *bhillata* (*bhallataka* ?).

196. Anointing with *vidanga* mixed with ghee, watering for seven days with salt water, and (applying) ointment made out of beef, white mustard, and sesame destroy the worms, insects, etc.

197. Creepers eaten away by insects should be sprinkled with water mixed with oil cake. The insects on the leaves can be destroyed by sprinkling the powder of ashes and brick-dust.

198. A wound caused by insects heals if sprinkled with milk after being anointed with a mixture of *vidanga*, sesame, cow's urine, ghee, and mustard.

199. Trees suffering from (damage due to) frost or scorching heat should be externally covered. Sprinkling with *kunapa* water and milk is also advisable.

200–201. The broken trees should be smeared with the paste of the bark of *plaksa* and *udumbara* mixed with ghee, honey, wine, and milk and the broken parts should be firmly tied together with the rope of a rice stalk. Fresh soil should then be filled in the basin around the trees, sprinkled immediately with the milk of buffalo and flooded with water. Thus they recover.

202. (Verse is missing.)

203. If the branches fall off, the particular spot should be anointed with the mixture of honey and ghee and sprinkled over by milk and water so that the tree will have its branches reaching the sky.

204. If the branches are burnt they should be cut off and the particular spots should be sprinkled with water

and milk and smoked with the shells of the crab, etc. Thus treated the trees will put forth fresh sprouts.

205. If the trees are scorched with fire the whole tree should be smeared with mud from the lotus creeper and then should be watered with *kunapa* mixture. Then its branches grow up to the sky.

206. When anointed with *vidari*, sugar, *nagajivha* (red arsenic), and sesame mixed together and when sprinkled with milk-water, trees struck with lightning put forth healthy sprouts.

207. Trees which are dried up due to heat caused by fire are cured when a mixture of sugar, sesame, and milk is used for watering and anointing them and when they are smeared all round by the mud from the bottom of a lotus plant.

208. If dried due to bad soil, the original soil from the root should be removed and it should be replaced by healthy soil and milk-water should be sprinkled over it.

209. If the drying is due to the lack of water, the trees should be watered with milk-water and properly fomented by the smoke of crab shells.

210. The wounds of the trees are healed by the treatment of anointing with the paste of the bark of *nyagrodha* and *udumbara*, cow dung, honey, and ghee.

211. The oozing can be cured by the (above stated) paste and by covering the part with the barks of *dhava*, *sriparnika*, *syama*, *vetasa*, and *arjuna*.

212. Diseases caused by wrong treatment can be conquered by sprinkling the mixture of water and milk and also by applying a paste of *vidanga* mixed with thick mud.

213. Jaundice can be brought under control only in weeks by sprinkling water mixed with the powder of barley and wheat added to honey and milk.

214. Non-productive trees bear fruits and flowers to one's complete satisfaction when they are fed with milk and *kunapa* water.

215. Unproductive trees fill the quarters with branches covered with flowers and fruits without fail if treated with cold mixture (?) of sesame, barley, *kulattha*, green gram, and black gram.

216–217. Sesame and the dung of the goat and sheep each measuring one *adhaka* (256 handfuls), barley measuring one *prastha* (64 handfuls), water measuring one *drona* (1024 handfuls), and corresponding quantity of beef if allowed to set for seven nights and then used for watering, the trees put forth flowers and fruits.

218. They produce fruits also if watered with the thick mixture of the flesh of tiger, leopard, and fox and with milk of elephant and buffalo.

219. Tender plants suffering from excess watering should be scratched with nails, uprooted, and every root should be smeared with the mixture of honey and *vidanga* and then should be watered.

220. Vegetables of cucumber types get cured of diseases when smoked around by the bones of cow and dog mixed with excreta of cat.

221. Very tender plants should not be exposed to excessive smoking. Excessive smearing, although gentle, also should be avoided by the wise.

222. Plants which are not cured by any one of the various above-stated remedies should be transplanted at other special sites.

Horticultural wonders

223–226. Several special processes with reference to the plants will be described hereunder. They are: bearing flowers and fruits round the year; bearing flowers and fruits out of season; producing fragrance; changing the tastes; changing the colors; changing the flowers; changing the fruits; changing the fragrance; arresting of fragrance; producing flowers on (non-flowering ?) creepers; transforming trees into a creeper; dwarfing the trees; mixing; longevity of ripeness; non-ripening; longevity of crop; destruction and quick rejuvenation; quick production of fruits; increasing the size of fruits and flowers at the very appearance; transformation into another species (?); and so on.

227. A healthy seed of a properly ripened mango (*makanda*) should be soaked in the blood of a tortoise and a hare and then should be dried in the direct heat of the sun. After a month it should be planted in a pit, previously prepared as per the method described before (verses 67 and 68).

228. Thereafter it should be showered with the milk of a she-goat. Then it blossoms into a tree with thousands of branches and produces lovely flowers and fruits round the year. This is no wonder.

229. Trees watered at the root with buttermilk, sugarcane juice mixed with the powder of beef, *bidanga*, and oil cake definitely produce beautiful flowers and fruits out of season for a period of one month.

230–231. Trees produce flowers and fruits out of season undoubtedly if the following procedure is followed:

Varahi, *jira* (cumin seed) and sugarcane juice should be kept for a month in a pot containing ghee prepared in the moonlight and when the mixture is well formed, roots of the trees should be smeared with it, and the basin should be filled with mud. Then sugarcane juice should be profusely sprinkled and the trees should be smoked with honey and *kunapa*.

232. An ordinary mango tree gets the good quality of a high class mango tree and puts forth fragrant blossom attracting the bees if it is smeared with the thick paste of *jambu*, coral, and the roots of *khus* and then sprinkled with the water from the same paste.

233. If mud, scented with buds of *asoka*, etc. is filled at the root, trees get a very attractive and strong fragrance.

234. *Kusmanda*, *vartaka*, *patolaka*, etc. produced from healthy seeds cultivated with marrow of a female boar and also nourished with the sprinkling by the same marrow mixed in water always produce seedless fruits.

235. A ball made out of the mixture of the flowers of *madhuka*, honey from lotuses, crystalline sugar, and *yasti* kept in a hole made at the root of a tree, produces long lasting fruits (on the tree).

236. A ball made out of the mixture of *asvaghna*, *langali*, the big and small *brhati* kept in the hole at the root of a tree watered with the same mixture, produces pungent fruits (on that tree) although their natural taste is sweet.

237. A tree which normally produces pungent fruits starts producing fruits sweet like nectar if thickly smeared at the root with the paste of the mixture made out of *bidanga*, *yasti*, *yava*, milk, and jaggery.

238. A tree producing sour fruits starts yielding sweet fruits if its roots are exposed and smeared with the mixture of the honey from the flowers of *madhuka*, *yasti*,

and grape, crystalline sugar, and barley (and then watered with the same ?).

239. The white flowers of a tree turn into a golden color if the tree is watered with the mixture of turmeric powder, *kimsuka*, cotton seed, *manjista*, and *lodhra*.

240. The white flowers of a tree turn into a golden color if it is smeared at the roots with the mixture of *manjista*, *darada*, milk, *kanksi* (kind of fragrant earth), and flesh of a pigeon.

241. Trees watered continuously with the liquid of *triphala*, barley, mango seed, and indigo; and also filled at the root with the powder of the same mixture produce fruits resembling collyrium (see *anjana*).

242. Trees treated with water and paste containing the mixture of barley, *kimsuka*, *manjista*, turmeric, and sesame and also smeared with the same paste bear red fruits.

243. Trees watered and smeared at roots with the mixture of the bark of the *salmali* tree, turmeric, indigo, *triphala*, *kusta*, and liquor bear fruits having the shades of a parrot.

244. Trees watered after being sprinkled at the root with the mixture of indigo, turmeric, *lodhra*, *vara (triphala)*, sesame, *asana*, *kasisa* and *yasti*—all powdered together—produce fruits of golden color.

245. *Bakula* trees blossom forth producing lots of *champaka* flowers if continuously fed with flesh water after filling the bottom with plenty of mud mixed with *kalaaya* and the skin of a python or snake.

(Some words are unintelligible.)

246. Plantain trees create wonder by producing pomegranate fruits if fed by water mixed with the urine of a hog and *ankolha*.

(A word is unintelligible.)

247. A castor tree produced from a seed cultured by the marrow of a boar, treated further by the process in the previous verse, produces *karavella* fruits.

248. Fragrance of the blossom can be changed by filling (the base near) the roots of the trees with the earth scented with the desired fragrance and then fed with water mixed with *jalada*, *mura*, *nata*, *valaka*, and *patraka*.

249. All types of flowering plants produce excellent fragrance if earth strongly scented by their own flowers is filled around the base (of the trees) and then fed with water mixed with *musta*, *mura*, *nata* leaves, and wine.

250. The same treatment used in the evening at their blossoming time along with fat, milk, blood, and *kusta* intensifies the natural fragrance of the blossoms of *punnaga*, *naga*, *bakula*, etc.

251. A big and strong mud pot should be filled with the mixture of mud and plenty of beef; and the *karavira* plant should be grown there with effort by watering profusely with cow dung and good quality beef.

252. The above stated plant of *karavira* should then be shifted to a pit, previously prepared by filling with cow bones, well-burnt ashes and then wetted by water mixed with beef. Thereafter, the plant should be fed with plenty of water mixed with beef. So treated, it is transformed into a creeper to blossom profusely and perennially.

253. A tamarind plant is grown into an excellent creeper if fed with water, mixed with the powder of *triphala*,

sesame, barley, and black gram and then smoked well with the turmeric powder.

254–258. A seed of the *kapittha* should be cultured hundred times with milk boiled along with roots of *dhatri, vaca, abhaya, asphota, asmapa, vetasa, simsapa, suryavalli, atimukta*, and *palasini* for over a month and then should be sown in a pit keeping in water mixed with ghee, honey, and ashes of cow dung, *bidanga*, sesame, and flesh of the boar. Thereafter, the pit should be filled with good quality soil measuring four fingers in thickness and then it should be watered with the decoction of barley, black gram, sesame, honey, fish, and flesh. The seed then grows into a creeper, without fail.

259–260. A seed of any variety, freely rubbed with the bark of mango creeper, jasmine, *dhataki*, and *madhavi* mixed with the milk of a she-goat and then sown in a pit, filled with soil dug up from around the roots of trees belonging to different species and thereafter sufficiently sprinkled with the powder of sesame and barley, and (the seed so sown) watered with curd and milk grows into the respective creeper.

261. If a tree is planted and grown faithfully with efforts by a person, in a pit as deep as man's height and properly covered from inside with new bricks it blossoms even in a dwarf condition.

262–263. A plant which is not too tender should be cut at its stem and then slightly burnt. Thereafter, it should be smeared with the mixture of ghee, cow dung, mineral salt, honey, and flesh. A nail should then be slantingly driven in the root. The plant then should be watered with milk-water. It then, produces beautiful branches and without fail produces fruits even in a dwarf state.

264. A plant grown in a pit supported with four pillars erected close to the root, carefully watered with milk grows into a dwarf variety.

265. If bulbs of various types of lotuses are uprooted, tied together firmly with threads, smeared with melted butter and honey and then planted, they produce those respective lotuses in bunches (on a single creeper).

266. Similarly several wonders of transformation can be worked out by tying together the stems of *karavira* and those of various species of pomegranate.

267. The ripening of fruits of a tree can be delayed by one year by piercing their roots with the long bones of monkey's legs dipped in the ichor of intoxicated elephant.

268. Ripening of fruits on a particular branch of a tree can be stopped by covering that branch firmly by the skin of the hunch of a bull that is just then killed.

269. The fruits on a particular branch of a tree do not ripen if it is covered seven times with the skin from the dewlap of a black bull, killed for the purpose.

270. A plantain tree with its root pierced with a golden rod heated in fire of dust of ivory, turns into a creeper producing fruits for a long time (or fruits of large size).

271. The plantain creeper produces wealth in the form of plantains as big as elephant's teeth if their roots are pierced with an iron needle which is heated in the fire made of dry cow dung and bones of pig, elephant, and horse.

272. The plantain tree definitely produces fruits as long as the pestle if the hollow tooth of a boar or a monkey,

filled with the ichor is carefully kept in the core of its root.

273. *Payasya, arjuna,* and *tarquari* get destroyed if profusely besmeared with salt water and if scratched by the bone of a hog all over the skin.

274. The coconut tree is destroyed if fed by water used for cleaning rice. Cotton tree immediately perishes if fed by water treated with the leaves of neem tree.

275. A stick of the *hingu* tree kept at the root of the plantain tree destroys it; the trees of ash gourd and the cucumber and the like perish if profusely smoked with the bones of crabs.

276. A tree drops away its fruits and flowers if watered by the decoction of *kulattha. Kimsuka, arjuna,* and *tarquari* (drop away their fruits and flowers) by feeding with salt or by kindling.

277. There is no wonder if a seed separated from a naturally ripened fruit is treated with the mixture of the oil of *ankolha* and of *nara* (*arjuna* ?), and sown in a heap of soil sprinkled with coconut water (gale water ?), grows at once.

278. A seed dipped several times in the oil of *ankolha* and the fat of a pig and then dried up and sown in a good quality soil sprinkled with coconut water (gale water ?) grows instantly without fail.

279. A seed cultured hundred times with the oil of *slesmata* sown and watered with coconut water (gale water ?) sprouts immediately.

280. A pomegranate seed sprinkled several times with the blood of a cock and dried up in the sun and then sown, immediately bears fruits if watered and smoked with human flesh and marrow.

281. If a seed is cultured in the oil of *ankolha,* fish, Gangetic porpoise, human being, hog, and crocodile; and then dried up, sown in a good soil and nourished by coconut water (gale water ?), the tree thereof produces flowers and fruits at once.

282. If a ripe *madhukarkata* is kept in an earthen jar and left (buried) underground and nourished by water of oil cake and flesh, it grows to the size of a jar.

283. The pomegranate tree transplanted seven times bears fruits as big as coconut if nourished with water containing *triphala,* melted butter, and marrow of a hog.

284. The *mulaka,* if planted in a pit filled with earth of good quality, burnt in the fire made of the bones of cow, hog, and dry cow dung, grows instantly.

285–286. If thick stems of cucumber and ash gourd plants are smeared with honey and melted butter, then tied together with straw rope and then covered with cow dung they become one. Later, if the stem is cut keeping the order of the root and the tip, *trapusa* (cucumber) too, bears fruits of ash gourd size.

287–288. A small hole should be bored in a tender ash gourd; and seed of the neem tree, profusely smeared with honey and melted butter should be dropped in through the hole. After the gourd is fully ripe the seed should be carefully extracted and sown. It then produces a plant which produces ample wealth in the form of brinjals of huge size.

289. A seed of *utpala* should be rubbed with the mixture of urine and dried dung of a she-buffalo for seven days and after sowing it in rich soil should be nourished with coconut water (gale water ?) (*karakajala*). It then grows into a *karavira*.

290. The same (i.e., the seed of *utpala*) if wrapped in python's skin, sown in a land full of mud stinking with *kalapa* (rotten lotus seeds) and then nourished with flesh water grows into a forest of *padma*.

291–292. The seed of *slesmataka* should be forced out and cultured seven times with the flesh (oil) of *ankolha* and then it should be rubbed with the dung of she-buffalo and dried in shade. If these seeds are mixed in dry buffalo dung and earth and sown and watered with coconut water (gale water ?) they turn into a plant of *kumuda* and there is no wonder.

Pleasure gardens

293. Garden houses should be protected from the sun by thick foliage of *atimuktaka* creepers with honey bees hovering over them and flowers strewn all over by breeze.

294. At places beautiful ponds adorned by swans should be made where trees planted on their borders look into the water at themselves with their eyes in the form of flowers.

295. An extremely long pond should be constructed there with its water free of aquatic creatures, easy to get in with pleasure boats and with flowering trees around it. It should be dark with the sprouting lotus leaves and at places having blue lotuses (see *utpala*)resembling the black pupils in the eyes of beautiful women.

296. At some place a pond may be constructed holding the reflection of the garden in its extremely clear water appearing like a garden growing in the midst of water. At other places a pond may be planned looking as though filled with abundance of the moon rays leaving the existence of water only to be guessed.

297. At intermittent places (in the garden), canopies—white like crystal and adorned with plantain trees—should be constructed where ample and gentle breeze should be blowing through the openings. The house—a plantain abode—white like the Himalaya mountain, well ventilated, and concealed by trees laden with fragrant flowers should be constructed amidst them (canopies).

298. At some place in the garden a well should be dug and constructed with stones all around having plenty of sweet water useful for sprinkling all the trees around.

299. At regular intervals of time a powder of *anjana*, *musta*, *usira* (the fragrant root of *khus*), *naga*, *kosataka*, and *amalaka* along with the fruits of *kataka* should be put in ample quantity in the well.

300. If the well water becomes turbid, bitter, tasteless, salty or foul smelling, it becomes clear, tasty, fragrant, and having many other good properties by the (above said) treatment.

Natural indications of groundwater for construction of wells

301. Currents of water rise upward from the nether world and spread in all the directions beneath the ground. Investigating these, one should plan wells.

302. If canes grow in a waterless region at a distance of three hands, currents flow to the west of it at the depth of one and half man-height. It is the west current that flows there.

303. On digging the depth of half a man-height if a frog of whitish color and yellowish soil are seen then

those are indications that on penetrating further through the layers the rock beneath will contain abundant water.

304. If close to the east of a *jambu* tree there is an ant hill, then to the southern side of the tree there is plenty of water at the depth of two man-heights.

305. At that spot after digging the depth equivalent to half a man-height if there are indications of a fish (?), the rock is of the color of a pigeon, and the soil is blue, there is ample water lasting for a long period.

306. In a land where a *nirgundi* tree is surrounded by ant hills, at a distance of three hands to the south a current of continuous sweet water will be seen at the depth of two and quarter man-height.

307. There, after digging the depth of half the man-height a *rohita* fish (?) is seen. Soil of a tawny color, thereafter whitish, and granules and sand appear in that order and then there is water.

308. If to the east of *badari* tree there is an ant hill, then the existence of water should be advised at the depth of three man-heights to the west. After digging half a man-height a white shrew is seen.

309. If the tree of *badari* has by its side a *palasa* tree then to its west, water is found at the depth of three and a quarter man-height and after digging a distance of one man-height an earthworm is seen.

310. Where there is an ant hill in the vicinity of *kastha* and *udumbara* trees water current flows to the western direction at the depth of three and a quarter man-height.

311. There the soil is whitish yellow, rocks are milk white and after digging half the man-height a mouse white like lotus is seen.

312. If an ant hill is sighted to the south in the vicinity of *bibhitaka* tree then to the east thereof water current flows at one and a half man-height.

313. And if the ant hill is to its west at a distance of one hand, water current flows at the depth of four and a half man-height.

314. After digging there at the depth of a man-height a whitish scorpion may be seen and then a rock of saffron color. On the western direction, however, the water current will vanish at the end of two years.

315. If to the northeast direction of a *kovidara* tree there is an ant hill along with *kusa* and *asita* then between the two trees there is a small, steady flow of water at five and a half man-height depth.

316. If a snake of pink color resembling the interior of a lotus on digging one man-height is seen, red soil and rocks of ruby color are said to be the indications.

317. If a frog is sighted amidst several trees then below it at the depth of four and half man-height at the distance of one hand there will be water.

318. A land which is full of *munj* grass or of *kasa* and *kusa* grass and where the soil is grainy and of a bluish color, there the water is in ample quantity and of sweet taste. Also if the soil is black or red, water is sweet and abundant.

319. A reddish grainy soil makes the water astringent in taste, the land of tawny color makes it caustic, the whitish land is stated to make the water saltish while the blue land makes it sweet.

Plant indicators for crop and animal production

320. Where there is *nyagrodha* tree the land is fit for producing barley crop, where there is growth of *tinduka* trees the land is good for *sastika* (a rice variety that matures in 60 days) and where there is an *asvattha* tree the land indicates production of all types of crops.

321. The growth of the *jambu* trees indicates that the land is favorable for growth of black gram and sesame, that of *sirisa* trees indicates favorability for green gram, that of *madhuka* indicates favorability for wheat, and the growth of *saptaparna*, favorability for barley.

322. The growth of *hastikarna* trees indicates the existence of elephants while that of *asvakarna* tree (name refers to leaf shape) indicates the existence of horses. Growth of *patala* trees indicates abundance of cows. The plantains indicate the profuseness of sheep and goats.

323. Mango trees indicate happiness, *bhallataka* fear, while the palm trees indicate health. *Khadira* and *sami* indicate famine, while *arjuna* gives satisfactory rain.

324. The blossoms of *picumanda* and *naga* ward off famine, *kapittha* suggests cry of hunger. The *nicula* tree indicates fear of dry spell or epidemics.

325. Thus Surapala, the expert of medicine whose glorious success had spread all over the world, composed this work of Ayurveda of trees out of interest and after mastering various skills of the profession under the patronage of King Shri Bhimapala who was the leader of the valiant.

Thus ends the Vrikshayurveda.

Notes

Figures indicate verse numbers.

5. Oblations in the form of water, sesame, cooked rice, and other gifts are offered at the time of funeral rites or death anniversaries of parents, ancestors, near relatives, etc. by their closely related survivor (usually a son) according to Hindu religion. The word "*kostharuha*" literally meaning "growing in the abdomen" is not commonly used in the sense of a "child" as is done here. It seems to be used for two reasons: (i) in order to match with the word "*bhumiruha*" and thus bring out the intended contrast between trees and sons more effectively; and (ii) in order to emphasize the uselessness of sons failing in their religious duty of "feeding" their deceased parents by offering regular oblations although they are born from the latter's very abdomen.

7. In fact four ages are stated, viz., *Satya*, *Treta*, *Dwapara*, and *Kali*. The author might have referred to "three" ages excluding *Kali*, the last age, as the same is unfit for gods, etc. to reside on earth due to its impurities and lack of regard for *dharma*.

8. *Dharma*, *artha*, *kama*, *moksha* are the four aims of human life— *Purusarthas*—as prescribed by tradition:

- *dharma*—It is the customary observances of rules and regulations according to the respective caste, sect, stage of life, etc., e.g., learning and teaching by a Brahmin, etc.

- *artha* (attainment of riches or worldly prosperity)—This is prescribed for an individual in the second stage of his life, viz., the stage of a householder (the other three stages are celebate, hermit, and recluse).

- *kama* (pursuit of sensual enjoyments)—This is also prescribed only for a householder.

- *moksha* (final emancipation; deliverance of the soul from the cycle of birth and death)—This corresponds to the fourth stage of an individual's life, viz., that of a recluse.

Sometimes only the first three (*Purusarthatrayi*) are mentioned as they are related to this world (verse 98).

15. Rajasuya is the name of a particular sacrifice performed by a king at the time of his coronation to declare and establish his supremacy over other tributary kings. It is believed to bestow upon the king, the highest reward.

20. "*Samropya no dukkhi*" is found in Majumdar (1935) and appears to be the correct reading. The context is about glorification of the trees. Hence, the fruit promised cannot be "suffering for seven lives".

29. This verse denounces planting *badari*, *kadali*, *dadimi*, and *bijapuraka* close to the residence only and does not contradict glorification of planting them elsewhere.

31. "*Ksirin*" is a general term describing any tree yielding "milk" (i.e., milk-like exudation).

42. "*Sopha*" as a name of a tree could not be traced. "*Saka*" meaning teak wood is the nearest likely word.

44. "Wealth, God, and kings have unlimited resources and power to make possible what is ordinarily impossible." Author's inclusion of "wealth" along with God and king shows his awareness of money-power.

47. *"Bahustambha vitapino"* (Borkar's text). *"Bahustamba vitapino"* (Majumdar's text). The latter makes better sense when compared with *"Aprakande stambagulmau"* (Amarakosa II.9). *"Gulma"* or *"stamba"* denote plants which do not have one prominent stem. *"Na vidyate prakando yasya"* and is often used in the sense of "bushes or plants growing in a cluster" as defined in Amarakosa.

53. *"Brhati"*—Two varieties (big and small) are listed in Bhavaprakasanighantu: *Solanum indicum* Linn. and *S. xanthocarpum* Schrad & Wendl.

56. *"Durakoorchitagram"* is not clear.

59. The second line is defective. Both Majumdar and Borkar texts read as *"Datvavasu vasumateem va gunavate"* which makes sense.

60. *"Beejadhani"* means the place that holds the seed, i.e., where the seed is kept. *"Nrnaamstreenaam"* is defective and must be read as *"Trnaasteernaam"* (covered with grass). *"Nistrnaam"* means "removing the grass".

62. *"Sthiram Lagnam"* indicates certain zodiacal signs, viz., Taurus, Leo, Scorpio, and Aquarius. When the Sun is in association with them the condition is astronomically called *"Sthira Lagna"* because any work done under these signs is supposed to be lasting.

63. After growing sesame or black gram in a particular land it is believed to be useless for growing any other crop at least for a year or two. While purchasing new farm lands, the farmer would investigate about the crops produced on the land during the previous two years. This practice is followed even today.

64. The reference to *"gokikas"* is noteworthy. *Kikasa* is the breast bone and the cartilages of the rib connected with it. In several verses (nos. 124, 151, 196, 216, 229, 251) of Vrikshayurveda there is a reference to *gomansa* (the flesh of the cow) and in yet others (verses 220, 252, 284) there is a reference to cow bones. The use of these parts of a cow in agriculture indicates an implied sanction to the killing of a cow which is sacrilegious according to Hindu religion. No doubt, there are references to killing of a cow or eating beef in the Vedic literature. Cow's milk was used in the sacrificial rituals. Considering this usefulness, the cow was regarded as sacred and gradually ill-treating or killing a cow came to be discouraged. Somewhere in the *Puranic* period, a total ban on the killing of a cow and on beef eating was effectively implemented and the *Smritis* (the ancient Hindu code of law) accorded statutory sanction to the same. It is evident from the above-stated references in Vrikshayurveda, such a ban did not stop the use of flesh and bones of a cow in agriculture.

In fact, ancient texts like Atharvaveda, Brhatsamhita, Krsisangraha of Parasara and the Sukraniti contain clear instructions on manuring including prescriptions of free use of beef, etc.

65. *"Tridvihastaistadvat"* is metrically defective. Majumdar (1935) reads as *"Dvichatustribhirantaritan"*. The required correction here could be *"Trichaturdvihastaistadvat"* to suit the meter.

68. *Kunapa*—This was a fertilizer consisting of flesh, meat, and marrow of several animals. After cooking these, various other substances like oil cake, honey, black gram, ghee, etc. were added. The whole compound was preserved and by mixing with water, liquid fertilizers were prepared. The long and complicated process of preparing and preserving *kunapa* is explained in detail in verses 101–106.

74–75. The import is not clear. When checked with similar verses in Majumdar and Borkar texts it appears to be a method of planting of plantains.

84. The meaning of "*talapika*" is not clear.

85–86. Before transplantation, the saplings of big trees are psychologically prepared through this chanting so that it can bear the shock of uprooting and replanting. Though not very suitable in a science text, the verses speak a volume for the tender care with which the trees used to be handled by the planter.

89. "*Shukra*" normally denotes Friday. Here it denoted the month of *Jyestha*.

91. "*Bhillota*" or "*bhillata*" (verse 195) must be the same as "*bhallataka*" (*Semecarpus anacardium* Linn. f.) (verse 323). It is a medicine for several diseases as compared with Bhavaprakasanighantu which reads as "*Hanti gulmajvarashvitravahnimandyakrmivrnan*".

93. "*Paryamprushaha*" cannot be satisfactorily rendered. Majumdar (1935) reads as "*patrairuparyasprshaha*" (leaves not touching each other at the top) which appears to be more appropriate.

94. "*Mandapa*", etc. describe the designs of planting. *Nandyavarta, sarvatobhadra, swastika, caturasra*, etc. are also technical terms in the science of *vastu* describing different designs (Brhatsamhita Chapter 53, verses 31–36).

96. The third and the fourth lines are not clear.

97. The verbal root *tri* (1.P.) means to cross over; to go beyond (e.g., a river). *Taraya*—its causal form means "making someone cross over", i.e., "save". The trees save mankind from poverty and hence are called "*taravah*". The derivation is explained at the commencement of the section on "protecting trees" in order to impress upon the human beings the need to protect them by reminding them of their obligation.

106. Verses 101 to 106 describe the procedure of preparing *kunapa*, the fertilizer. It requires procuring flesh, etc. of several animals. Since the whole description may sound unusual, in the final verse Surapala specifies that what he has stated has the sanction of earlier thinkers.

134. Third line is metrically defective. It may read as "*Peeyushahrdyasurabheeni bahooni bilva peenani....*"

138. "*Kashapala*" makes no sense. "*Jhashapala*" might have been the reading.

143. "*Kusumaih bibharti*" for "*kusumani bibharti*" (use of instrumental case for object) is exceptional.

144. "*Sasidhu*" in the first line is difficult to construe.

145. "*Pushpati*" here and elsewhere too, should have been "*pushpyati*".

148. "*Kuwaragrena*" is not intelligible. The same word appears again in verse 176. *Kutharagrena* could be the word at both the places. The meaning would then be "with the tip of an axe". The tree is to be scratched either with the nail by a charming lady or by the tip of an axe. The implied comparison, however, is far from being complimentary to a charming lady.

151. This verse can be compared with Shakuntala, Act I, where a jasmine creeper is described as "the bride" of the mango tree.

153. "*Lola keela kalapa kavalyh kalita cha malli*"—The content is effortlessly embellished with alliteration.

158. "*Bhasmaavajnagnisambhavam*" does not make any sense. Instead, it would be appropriate if it is replaced by "*Bhasmaavajragnisambhavam*" implying "the fire caused by lighting".

160–162. The *mantra* for protecting the trees is in the form of an order by Hanuman to rats, shrews, grasshoppers, etc. which destroy the fields. The mighty Hanuman is stated to be threatening them away by thumping his powerful tail, hard like diamond. Other epithets, viz., *lanar, dehar, and pachar* are not intelligible. The grammatical formations too are not clear. When compared with the Majumdar and Borkar texts the wording is not identical. Majumdar and Borkar also read a full *anustubh* verse describing Hanuman as a lion among monkeys. The thunder is stated to be the exploding sounds produced by the wind which is inherent in Hanuman, who is a *Vayuputra*. Probably the words in Surapala's texts, viz., *hanar, dehar, pachar*, etc. are used in an onomatopoeic manner, imitating the rumbling of clouds. *Mantras* are sacred texts and words in them are more important than the sense. The variations therefore, are noteworthy. "*Hum*" and "*phat*" are the exclamations in the chanting used for driving away evil forces. "*Swaha*" is an utterance used at a time of offering oblations in the fire.

170. "*Avrddhiphalite neerasata cheti prakeertitah.*" The compound word "*neerasata*" gets split as "*neera*" and "*sata*", the former in the third *pada* and the latter in the fourth. This is known as "*yatibhanga dosa.*" We occasionally come across such blemishes in Surupala'a composition.

171. "*Akala phalasrava*" (untimely falling away of fruits) also gets split as "*akala*" and "*phalasrava*" which is *yatibhanga*.

185. The gap after "*sekah*" can be filled by "*kunapatoyaishcha*" as compared with Majumdar's text which reads as "*kunapajalaishcha jayobhavet*" (verse 182).

187. "*Panchamula*"—Two varieties are known (i) *brhat*, and (ii) *laghu*. The combination of *sriphala, sarvatobhadra, patala, ganikarika*, and *syonaka* is the *brhatpanchamula*; and the combination of *salaparni, prsniparni, vartaki, kantakarika* (*Solanum indicum*), and *goksura* is the *laghupanchaka*.

236. "*Brhatidvaya*"—see note on verse 53.

241. "*Phalatrika*" is the same as "*triphala*" .

247. The text appears to be "*tathyva erandah*", but it leads to "*visandhi dosa*" in which letters are kept apart although as per the rules they should be joined. Here "*tathyvyrandaha*" does not suit the meter.

254–258. *Astamuli* (a collection of eight roots from different plants)—According to Brhatsamhita (Chapter 55, verse 22) the names of the eight plants are *asphota, dhatri, dhava, vasika, vetasa, suryavalli, syama*, and *atimuktaka*.

Asmapa—guessed in place of *aspama*, probably same as *asmaghna* or *asmabhid* (so called because it dissolves kidney stone).

277. The word "*karaka*" in the text has two meanings: (i) coconut, and (ii) gale. Hence the meaning is ambiguous.

277, 280. The reference to human flesh is curious. Sometimes *nr* or *nara* indicates the *arjuna* tree (verse 277). However, *naramansa* in verse 280 is difficult to render in that manner.

280. *"Dadima"* in the second line is metrically faulty. The second letter has to be *deergha*. *"Dadimba"* suits the meter.

290. *"Utpala"* is the blue lotus; and *"padma"* is the lotus that closes towards the evening. The verse describes the recipe to transform the seed of the former so as to produce the latter.

291. *"Kumuda"* is a lotus that blooms at the rise of the moon. *"Kumudam kumadam"* is a figurative expression. The second word means a man with bad conceit.

305, 307. The reference to "fish" underneath the ground is curious.

306. Read as *"nirgundi"* instead of *"gundi"*.

About the Translator

Dr Nalini Sadhale obtained MA in Sanskrit with distinction from the University of Poona, Pune, India and PhD in Sanskrit from Osmania University, Hyderabad, India. She has had a distinguished professional career and she retired in 1994 as Professor and Head of the Department of Sanskrit, Osmania University, Hyderabad. She distinguished herself by serving on several prestigious organizations, committees, and boards. She worked as Sastra Chudamani Scholar of the Rashtriya Sanskrit Samsthan, New Delhi, India. She has several publications which include Katha in Sanskrit Poetics, Sanskrit Verse Translation of Hindi Tulasiramayana, translations of Urvashi and Vasantsena from Sanskrit to Marathi, and Sitajosyam, a Marathi translation of Telugu play by Narla V Rao. She is currently working as Chief Editor of Panchadhara, a Marathi quarterly journal.

Present address: 3-6-468, Hardikar Bagh, Himayatnagar, Hyderabad 500 029, Andhra Pradesh, India.

Bibliography

Sanskrit texts

Anonymous. 1916. Susrutasamhita. Nirnaya Sagar Press, Bombay, India.

Baldevprasad Misra (ed.). Brhatsamhita of Varahamihira.

Borkar, D B (Tr.). Sartha Upavanavinoda. Borkar Mala, Pune, India.

Chunekar, K and Pandey, G (eds.). 1986. Bhavaprakasanighantu of Bavamisra. 7th edition. Varanasi, India.

Majumdar (Tr. and ed.). 1935. Upavanavinoda. Indian Research Institute, Calcutta, India.

Sharma, Pt. R D *et al.* 1981. Carakasamhita. Chowkamba Bharati Academy, Varanasi, India.

Other works

Dasgupta and De. 1947. A History of Sanskrit Literature. Vol I. University of Calcutta, Calcutta, India.

Gray, L H. 1962. Vasavadatta. 2nd edition. Motilal Banarasidas, New Delhi, India.

Joshi, Pt. M. 1962. Bharatiya Sanskriti Bharatiya Kosha. Sanskriti Kosha Mandal, Pune, India.

Keith, A B. 1929. A History of Sanskrit Literature. Oxford University Press, London, UK. (Reprinted in 1956.)

Dictionaries

Anonymous. 1929. Amarakosa. Vth edition. Nirnaya Sagar Press, Bombay, India.

Apte, V S. 1977. Sanskrit–English Dictionary. Prasad Prakashan, Pune, India.

Williams, M. Sanskrit–English Dictionary (Indian edition). Munshiram Manoharlal Publishers Pvt. Ltd., New Delhi, India.

Commentaries

Biodiversity Perspective

K L Mehra[1]

Vrikshayurveda, written by Surapala in Sanskrit, is not readily available in Indian libraries. It is, therefore, appreciable that Dr Y L Nene, Chairman, Asian Agri-History Foundation, not only procured a copy of the text from the Bodleian Library, Oxford, UK, but also arranged to get the text translated into English. Dr Nalini Sadhale has done a commendable job of translating the Sanskrit text. A copy of the translation was provided to this commentator for comments on the plant biodiversity and ethno-botanical aspects of the text. The commentator assisted Dr Sadhale by providing botanical names of the plant species mentioned in Vrikshayurveda.

Vrikshayurveda, which means "The Science of Plant Life", mainly deals with various species of trees and their healthy growth and productivity. The text mentions about 170 species of plants, including herbs, shrubs, and trees. There are 325 systematically arranged verses, beginning with a salutation to Lord Ganesha, followed by glorification of trees, and composition on tree-planting and production. Various chapters deal with the raising of orchards, agri-horticulture, and tree-planting near houses. Special references are made on procuring, preserving, and treatment of seeds and planting materials; preparation of pits for planting; selection of land (soil); methods of irrigation and ways to locate groundwater; nourishment and fertilizers; diseases of plants and plant protection; laying out of gardens and orchards; creation of agricultural/horticultural wonders; use of plant species as indicators of crop and animal production; and description of sacred plants. This commentary deals with biodiversity conservation and utilization aspects of the text.

1. Director (Retd.), National Bureau of Plant Genetic Resources, New Delhi 110 067, India. Present address: 38 Munirka Enclave, New Delhi 110 067, India.

Biodiversity conservation

It seems that the text was written to help conserve plant biodiversity of selected tree species. Surapala admitted frankly that he compiled, out of interest, the works of sages and that he had not stated anything of his own (verses 3, 325). He elaborated on the importance and glory of trees and took advantage of common peoples' beliefs, religious attitudes, superstitions, and folk knowledge to persuade people to plant trees (verses 4–34). He also elaborated on the benefits that a person was likely to derive by planting trees, both in this life and after life (in heaven) or after re-birth. The cultural history of India is associated with religious beliefs and any emphasis on or arguments dealing with plant-man-God relationship appeals to people even today. This attitude still prevails in India and many sacred groves and places of worship have continued to preserve *in-situ* biodiversity of specific species of plants. Surapala took special pains to classify plants and planting materials (verses 45–51) and provided methods to procure planting materials and extraction of seeds (verse 52). He provided instructions on the treatment of seeds

and planting materials to promote germination, seedling growth, and seedling care (verses 53–62). Vrikshayurveda deals with cultural practices, e.g., sowing of seeds and planting materials; transplanting of seedlings; spacing between plants and planting design; preparation of underground pits for seedlings; seed and fertilizer treatments; watering; planting of bulbs; sowing or planting time; layout of garden or landscaping; and other cultural practices (for details see verses 63–99). Several verses of Vrikshayurveda deal with plant nutrition; organic fertilizers and their methods of preparation and application; weeding; and herbal fertilizer recipes, with or without animal products, but using one or more species of plants in specific formulations for target species of trees (for details see verses 101–115). Several verses (127–154) provide information on irrigation methods, using water mixed with herbal products obtained from different plant species and animal products. Several verses (116–156) deal with methods to increase fruit production in different plant species, using herbal formulations, some of which are species specific.

Vrikshayurveda deals with symptoms of plant diseases and insect attack, and suggests several methods, using herbal preparations to maintain excellent health of different plant species (for details see verses 165–222). Vrikshayurveda suggests ways to create horticultural wonders with specific species of plant and animal products, singly and in formulation (for details see verses 223–300). Most of these recommendations need to be tested to verify the claims, while others such as plantain trees producing pomegranate (verse 246) are simply not feasible. Surapala compiled the available information and systematically organized the recommendations, hoping that the readers would follow them and use them (verse 3). It seems that Surapala provided extensive recommendations on cultural practices from planting to fruit production and plant protection so that people will conserve the plant biodiversity and enjoy its benefit (verse 3). He also made specific recommendations relating to species of plants that grow in specific environments: marshy, arid, and ordinary lands (for details see verses 41–43). This reveals his deep understanding of the agroclimatic conditions and of adaptation of specific plant species to specific environments or lands.

Plant indicators

Surapala carefully recorded several plant species and the ecological conditions under which they grow. Thus, he noted that occurrence of certain plant species could be used as indicators for crop production, animal production, water availability, and other attributes.

Crop production

Surapala referred to seven species of trees considered as indicators of specific crop production areas due to their natural occurrence on land. These tree species are: *Ficus benghalensis* for barley, *Diospyros tomentosa* for a rice variety that matures in 60 days, *Ficus religiosa* for all types of crops, *Syzygium cuminii* for growing black gram and sesame, *Albizia lebbek* for green gram, *Madhuca indica* for growing wheat, and *Alstonia scholaris* for barley production (verses 320–321).

Animal production

Surapala mentioned (verse 322) that the occurrence of *Butea monosperma* indicated the presence of elephants,

asvakarna of horses, *Stereospermum suaveolens* of cows, and plantains of abundance of goats.

Water availability

Surapala mentioned that the natural occurrence of *Syzygium cuminii* near ant hills (verse 304), *Scirpus grossus* (verse 306), *Ziziphus mauritiana* and *Butea monosperma* (verse 309), *kastha* and *Ficus glomerata* (verse 310), *bibhitaka* (verse 312), and *kovidara*, *Desmostachya bipinnata*, and *Indigofera tinctoria* (verse 315) would indicate availability of water for irrigation. These claims need to be verified.

Other situations

Surapala also compiled folklore on tree species (verse 323) which were considered as indicators of happiness (mango), fear (*bhallataka*), health (palm tree), famine (*khadira* and *Prosopis cineraria*), and rain (*Terminalia arjuna*). The flowering of *Azadirachta indica* warded off famine, *Limonia acidissima* suggested cry of hunger, and *Barringtonia acutangula* indicated fear of dry spells or epidemic conditions (verse 324).

Ethno-botany

Sacred plants

Several verses (10–19) of Vrikshayurveda elucidate the relationship between certain species of plants and the religious life of people. Specific plant species were considered sacred and especially associated with specific gods and goddesses, e.g., *Aegle marmelos* and *Ficus benghalensis* (Siva), *Azadirachta indica* (Sun), *Mangifera indica* (Garuda), *Butea monosperma* (Brahma), *Ficus glomerata* (Moon), *Madhuca indica* (Parvati; also other deities), and *Ficus religiosa* (Vishnu, Hari).

Auspicious and inauspicious plants

Surapala (verses 24–26) provided a list of auspicious and inauspicious trees for planting and their location near a house, e.g., *Ficus benghalensis* (auspicious when planted in the east but not in the west), *Ficus glomerata* (south, not north), *Ficus religiosa* (west, not east) and *Ficus lacor* (north, not south side of a house). He also mentioned that laying of a garden to the south, southwest, or northeast of a house leads to quarrels, distress, and adversity (verse 33). Therefore, he recommended that gardens should be laid out on the western, northern, and eastern sides of a house (verse 34). He mentioned that shadows of trees should not fall on the house (verse 28).

Surapala also listed (verses 29–32) several plant species considered to be inauspicious. The planting or natural occurrence of such plants leads to unhappiness (*Ricinus communis*, *Bauhinia variegata*, *Cordia wallichii*, *Terminalia arjuna*, and *Pongamia pinnata*), danger from enemies (thorny plants, in general), loss of wealth (*Manilkara hexandra*), and loss of progeny and prosperity (*Ziziphus mauritiana*, *Musa paradisiaca*, *Punica granatum*, *Citrus limon*, *Indigofera tinctoria*, and *Curcuma longa*). The taboos associated with inauspicious trees and planting of auspicious trees contained in Vrikshayurveda evoke curiosity. The text does not specifically mention why specific plant species are to be avoided. The text is also silent on the issue of planting specific trees but not about others on a particular side of the house. Perhaps, it may refer to the climate and direction of the sun and rain in relation to different rooms and their uses within the household.

Conclusions

An analytical study of Vrikshayurveda written by Surapala would enable the contemporary investigators to delve into the past compilations of scientific works on tree plantations—their growth and productivity—and often linking modern knowledge with that of the past. The scientific identification of Sanskrit plant names, the therapeutic and various folk uses of plants, and beliefs about different plant species constitute important aspects of conservation and uses of plant biodiversity. Such knowledge, especially folk beliefs and other ethno-botanical uses of plants would help us understand plant-man-environment relationship for preserving biodiversity and knowledge bases for the use of future generations of humankind.

Agronomic Aspects

S M Virmani[1]

The English translation by Dr Nalini Sadhale of Vrikshayurveda written by Surapala, around 1000 AD(?) on the broader subject of 'arbori-horticulture' comprehensively deals with the development and maintenance of gardens. It contains knowledge on the allied concern of sustaining the quality of soils and the place of plant species to meet food, shelter, and aesthetic needs of the different strata of society. If scientific knowledge, as we understand it today, means gathering accurate and systematic knowledge, then, Surapala's tome on Indian arbori-horticulture is an organized attempt on how plants grow and how their production can be sustained by agronomic management. Surapala's Vrikshayurveda may be rated as an early literary work on the Indian philosophical systems of knowledge, relating to agricultural sciences. After all, the very term 'science' entered the English lexicon during early 18th century. It came from France where it meant (or was synonymously used with) knowledge. Surapala's text meets all the broad parameters of the term 'science' because it is an objective unbiased systematic enquiry into systematic learning on how plants grow, flower, and can be reproduced. The text is largely driven by a sense of curiosity by the author on the phenomena of production of trees. I would describe the text as a mélange of science, philosophy, and social sciences. We probably have come a full circle in our scientific ethos. Today, we place a high value on science as a tool for social advancement. When we do not fully understand all the components of a scientific system, we bridge the gap with what we today call 'fuzzy' knowledge. When all steps of a phenomena are fully documented within a scientific regime—we call it science. Seen in this perspective Vrikshayurveda, may be one amongst the early texts that ushered in a scientific ethos in Indian agricultural sciences.

In this commentary I will briefly discuss a few important subjects that I have picked up from the text. These are: the place of Vrikshayurveda in contemporary agricultural sciences; an analysis of suggested methods of successfully growing trees of various kinds—ornamental, fruit-bearing, shade-giving, etc., and their relevance to contemporary science and the practice of arboriculture; the ecological niche for trees during Surapala's time and today; and finally, what use the knowledge base contained in the Vrikshayurveda can be made as a springboard for sustaining modern agriculture in the approaching millennia to provide food and nutrition for the growing populations.

Vrikshayurveda in contemporary times

In today's world, global environmental issues relating to sustainable development have emerged as topics of

1. Principal Scientist (Agroclimatology), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, Andhra Pradesh, India.

major concern. The Bruntland Commission report of 1976 and the Agenda 21 adopted by the United Nations Conference on Environment and Development have challenged us to look beyond the obvious issues of producing more food together with giving a fuller recognition to issues of biodiversity. Vrikshayurveda is replete with references that suggest that raising trees is a means of attaining the four broad aims of life: *dharma, artha, kama,* and *moksha,* which broadly mean that for an holistic development of mankind and its welfare in all its spheres including inter-generational equity, trees have an important place. Fortunately, these are key words for today's sustainable development of agriculture.

In the text, considerable details are made available on the kinds of trees—both shade-giving and fruit-bearing—and flowering shrubs that can be successfully grown and their benefits they provide. Based on their growth habit both above- and below-ground, and the kind of products they yield, recommendations are made on aspects of their planting and the distance of location of trees around the house. As an example, the text suggests that the distance of planting of the tree from the residence should be such that its shadow does not fall on the house. Today, we know that the diameter and height of the canopy of a tree are related to the extent to which its roots can spread, i.e., the diameter is related to their circumference of spread and root depth is related to the height. During the old days, houses were mainly built with wood or mud and had weak foundations. The roots of the tree could damage the structure: therefore the recommendation. Many such examples abound in the text.

Methods for sustainable horticultural production

It is also evident from the study of Vrikshayurveda that the people were those days well aware of the impact of the quality of the soil on the growth of trees. Three types of soil with respect to water content were recognized: arid, marshy, and ordinary. In our agroecological studies today, we use a similar classification: arid lands are moist for a short period and limit plant growth due to a short growing period; wetlands or marshy lands are over-supplied with water but have poor soil-air-water relations; and the ordinary lands (the uplands) have a semi-arid soil moisture regime. These three soil types are further sub-divided by their color and mineral content, and the presence of soil biota and stones. In fact, the soil classification systems in use today to assess suitability of land for various purposes employ somewhat similar criteria (Fig. 1).

The Vrikshayurveda recommends that lands that are either acidic or salty or have an abundance of stones and gravel are dry (with no accessibility to water); and lands with ant hills are not suitable for horticultural production. Incidently, even today we use the same indicators to judge land suitability for laying out tree-plantations.

The text abounds with references to the various methods for raising plants, e.g., from seed, from stalks, from bulbs, etc. The quality of some seeds having long periods of dormancy was known. Methods for treating such seeds with various forms of organic matter and by using heat treatment to break the dormancy were recommended. It is thus suggested that the learned persons of Surapala's time had carefully observed

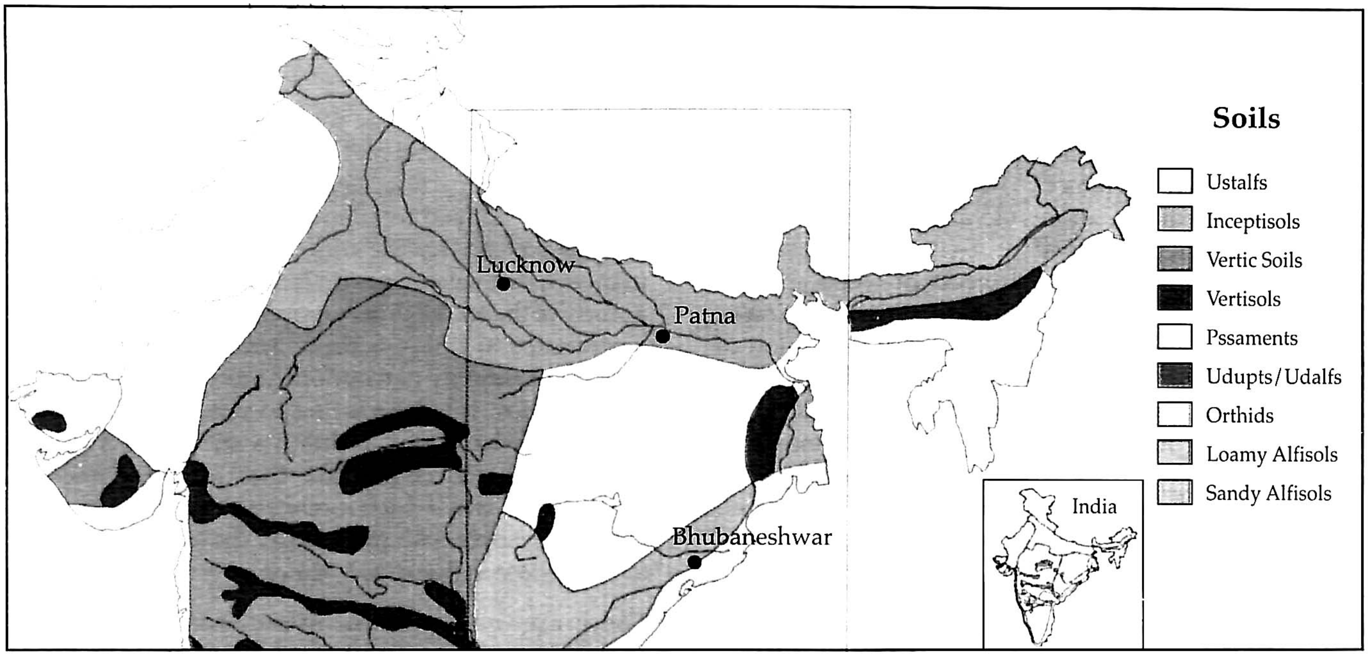


Figure 1. The probable region of Surapala's study.

various phenomena related to the establishment, growth, and development of trees, cataloged them in a systematic manner, and were operationally using the information in their day-to-day work.

In the book, there is an extended section on methods of planting trees. Recommendations on planting distance for different species of trees were suggested from 6 m to 10 m. Observations in the text, such as planting trees too far resulting in losses due to high velocity winds and that trees produce low yields when planted too close reveal that careful studies must have been made over sufficiently long periods of time (something that we call long-term experiments, today). The subject of the preparation of pits includes references to the depth, diameter, addition of soil mixed with ash (high in K), encrushed bones (high in Ca), farm-yard manure, and ingredients having properties for controlling soil pathogens. The knowledge on mulching the soil surface (to save on water requirements), grafting, transplanting, plant protection seems to be well developed at the time when Vrikshayurveda was written. Integrated

pest management methods—cultural, organo-chemical, and smoke—were probably used extensively.

The nourishment of different trees as per their mineral requirements in time and space was another aspect which was well understood. There are references of the application of liquid manures of various kinds of animal origin for the preparation of farm-yard manure, and oil cakes/plant residues. The subjects of weed control, water management, ripening of fruits, preservation of flowers for longer periods of time, and protection of gardens from animal damage are well described. There are notable references of spraying of some flowering shrubs and creepers with wine—apparently to meet iron deficiency. Similarly the knowledge to control plant pests by organic formulations seemed to be well developed.

Ecology and Vrikshayurveda

The place of horticulture in ecology both at the home garden scale and at the field scale was well understood, as is evident from references such as in verse 9: A person is honored in Heaven for as many thousand years as the days he resides in a house where *tulasi* (a kind of flowering shrub) is grown; or in verse 10: And if one properly grows *bilva* (a tree), which pleases Lord Siva, in his family (courtyard), the goddess of riches resides permanently (in his house) and this (riches) is passed on to his sons and grandsons. Apparently the place of trees in environmental maintenance and food chain was well understood. The saints and philosophers of the time extolled the people to 'grow more trees'— a slogan that we seem to have rediscovered during the past few decades.

Modern agriculture and Vrikshayurveda

It would be naive of me to suggest that all that was written and compiled on the art and science of arbori-horticultural aspects of agriculture, a thousand years ago, can be applied or adapted in modern agriculture; nor do I pretend that the knowledge base was adequate to meet today's demands on land for food security. But a study of the text of Vrikshayurveda gives the scientists a reference in time—a benchmark—to pinpoint the source of visionary perceptions shrouded in mystery of Indian ethos. It is interesting to note that the Indian knowledge base was deductive and carried with it inductive logic. Issues like location specificity of technologies with which modern science of agriculture is still to grapple with fully, to say the least, was known to the people in Surapala's times.

There are indeed many hypotheses and sayings included in Vrikshayurveda that cannot be substantiated today. Further genuine research for knowledge in the discovery of these hypotheses consistent with known facts on a holistic system of world order during different eras or time-scales need to be constructed. Nonetheless, Surapala's tome suggests that many theories of our times were first logically thought of or hypothesized by the ancient thinkers of India some 1000 years ago.

Finally let me add an **epilogue**. A study of Vrikshayurveda leads one to believe that there is no reason to suggest that any particular innate racial or national deficiency exists in any region of the world to develop systems of knowledge. The growth of science and its advancement has to be nurtured at all times. Scientific progress is a cumulative effect of advancement

of knowledge. We must, therefore look back at the past, but with a critical reverence, so that we can understand the reasoning of that age and plan for times ahead. I am not suggesting for a moment that the people of Surapala's time had already achieved a level of agricultural technology equal to what we know in modern times. But we must keep plodding ahead: with our feet firmly on the ground which has been nurtured by scholars like Surapala, and we must set our eyes on achieving the goals of sustainable food security for our people in the years to come.

It has been a learning experience for me to go through the pages of Vrikshayurveda. I commend it to all who are interested to learn from the past and to build a future on a firm corner-stone of science.

Ailments

Y L Nene[1]

I had been reading references to Surapala's Vrikshayurveda for the past several years in bits and pieces. This is the first time I could read an English translation of the complete treatise; thanks to the excellent effort by Dr Nalini Sadhale. This time the Vrikshayurveda made a definite impact on my mind and I felt incrementally more excited each time I re-read the translation. Surapala, in this brief treatise, has documented the wide knowledge-base related to arbori-horticulture that existed centuries ago in South Asia. I would like to elaborate below the reasons for my excitement:

- Plant protection was already recognized as an important activity. Details of the symptoms of various disorders must have been observed over long periods before arriving at definite descriptions and attributing specific symptoms to various causes. I am not aware of any other attempt in the world by which plant disorders were classified into two groups; i.e, internal and external before the time of Surpala. Further it is very significant that physiology of trees was considered similar to those of humans and therefore classifying the internal disorders into *vata*, *kafa*, and *pitta* kinds (humors) as had been done in case of humans. Several of the symptoms described can be attributed today to fungi, bacteria, viruses, or nematodes. In addition, damage due to other non-infectious causes (external) such as excessive heat, frost, mechanical injuries, drought or waterlogging, birds, excessive growth of creepers (dodder ?), and competition by weeds was recognized (see Table 1).

- Considerable thought must have been given over centuries to the remedies before prescriptions to manage the disorders could have been formulated. It is most significant that various methods of treatments, adopted today, were conceptualized and practiced centuries ago. Seed treatments, prior to sowing, to ensure successful and vigorous germination were given a lot of importance. Good nutrition was recognized as a preventive measure for ailments and at the same time wrong treatments and excessive application of remedial materials were recognized as problem-creating situations. Dressing of wounds, mechanical or physiological, were in vogue. Application of pastes over affected tree surfaces was suggested. Drenching of soil with various materials was a recommended practice. Treating roots before transplanting was recommended. Fumigation of trees and seeds by burning (to produce smoke) specific materials was considered to be useful. Spraying/dusting with appliances, as we do today, had not evolved, but the crude versions of these are found in sprinkling aqueous suspensions of materials and application of brick-powder as dust.

- Several botanicals and other materials had been identified and recommended for application on ailing plants. We know today that many of the botanicals

1. Chairman, Asian Agri-History Foundation, 47 ICRISAT Colony-I, Brig. Sayeed Road, Secunderabad 500 009, Andhra Pradesh, India and also Deputy Director General, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, Andhra Pradesh, India.

Table 1. Information contained in the Vrikshayurveda related to kinds of disorders observed in trees, causes and symptoms attributed, and remedies suggested.

Disorder	Cause given	Symptoms	Cause elaborated	Possible causes[1]	Treatment materials
Internal	*Vata*	Trunk slender and crooked; knots on trunk or leaves; hard fruits (less juicy and sweet); gradual defoliation; flower and fruit drop; general yellowing of leaves and fruits.	Arid land on account of excessive supply of dry and pungent matters.	Underground mechanical barrier; leaf-galling insects; root-infecting fungi or nematodes; viruses; saline/ alkaline soils.	Application of fermented mixture of hog fat, porpoise oil, ghee (clarified butter), hemp, horse hair, and cow horn—boiled and set to a decoction; also use of *panchamula*.
	Kafa	Fruit-bearing delayed and fruits are tasteless and ripen prematurely; oozing without wounds.	Appear in winter and spring if trees are excessively watered with sweet, oily, sour, or cold materials.	Fungal gummosis/ rot; nutrient deficiencies or toxicities; excessive watering.	Deposition of white mustard paste at the roots followed by watering trees with a mixture of sesame and ash; earth at the roots of trees should be removed and fresh dry earth should be placed.
	Pitta	Leaf yellowing; premature drop; decay of flowers and fruits.	Occur at the end of summer if trees are excessively watered with bitter, sour, salty, and strong materials.	Viral disease; salinity in irrigation water; predisposal to blossom blight and fruit decays due to fungal/bacterial infections.	Watering trees with the decoction of milk, honey, *yastimadhu*, and *madhuka*; watering with decoction of fruits (*triphala*), ghee, and honey.
External	Scorching heat/ frost	Leaf yellowing; symptoms can be similar to *vata*-type.	Roots eaten by insects.	Water stress predisposing trees to attack by pathogens/ insects; frost damage.	Watering trees with cold water for 7 days will remove insects from roots/branches; smearing the roots with a paste of milk, *kunapa* water, and cow dung with water or with a mixture of white mustard, *vaca*, *kusta*, and *ativisa*; sprinkling of milk over insect-caused wound, followed by application of paste containing mixture of *vidanga*, sesame, cow's urine, ghee, and mustard. Effects of scorching heat or frost can be reduced by covering trees and sprinkling with *kunapa* water and milk.
	Excessive stormy winds	Uprooting, breaking (i.e., branches fall or remain attached), and/or twisting of trees.	Stormy winds.	Storms leading to mechanical damage.	Broken trees should be smeared with a paste of the bark of *plaksa* and *udumbara* mixed with ghee, honey, wine, and milk; broken parts should be firmly tied together with rope made from rice stalk; fresh soil should

continued

Table 1. *continued*

Disorder	Cause given	Symptoms	Cause elaborated	Possible causes[1]	Treatment materials
					be filled in the basin, sprinkled with buffalo milk and water. If branches fall off, the particular spot should be dressed with the mixture of honey and ghee and sprinkled over with milk and water.
	Fire/lightning, soil aridity, water stress	Drying of trees; symptoms similar to *vata*-type if exposed to heat on arid soils.	na[2]	Same as causes given.	Burnt branches should be cut off and cuts should be sprinkled with water and milk, and smoked by burning crab shells. If scorched with fire, whole tree should be smeared with lotus mud and then should be watered with *kunapa* mixture. Tree struck with lightning should be anointed with *vidari*, sugar, red arsenic, and sesame mixed together and then sprinkled with milk-water. In case soil is bad, it should be replaced with good soil and sprinkled with milk-water. Water-stress: water with milk-water and foment by crab shell smoke.
	Struck by axe, etc.	Trees wounded resulting in drying up.	na	Same as causes given.	Tree wounds are healed if paste of the bark of *nyagrodha* and *udumbara*, cow dung, honey, and ghee is applied.
	Faulty seed	Trees become unproductive.	Lack of appropriate seed treatment; wrong remedies used.	Seed infected with pathogens or infested by insects.	Seed should be treated with milk, mustard, ash of sesame and *brhati*, rubbing with cow dung, honey, and/or *bidanga* (see verses 52–57).
	Ants	Foul smell, original fragrance missing; reduction of leaf size, stunted seedlings.	na	Ants could mean a wide range of insects.	Worms (caterpillars ?) accumulated on trees can be removed by smoking with a mixture of white mustard, *ramatha*, *vidanga*, *vaca*, *usana*, and water mixed with beef, horn of a buffalo, flesh of a pigeon, and powder of *bhillata*; anointing trees with *vidanga* mixed with ghee, watering for 7 days with soft water, and applying ointment made out of beef, white mustard, and sesame; sprinkling powder of ashes and brick-dust.
	Excessive watering	Symptoms similar to those produced in case of damage by ants.	Trees suffer from indigestion.	Same as cause given.	Tender plants should be scratched with nails, uprooted, and every root should be smeared with the mixture of honey and *vidanga*, and then watered.

continued

Table 1. *continued*

Disorder	Cause given	Symptoms	Cause elaborated	Possible causes[1]	Treatment materials
	Friction with other trees, continuous shade, inhabitation by too many birds, excessive growth of creepers, growth of weeds nearby.	Destruction of trees.	na	na	Manuscript is silent; perhaps it is assumed that causes will be eliminated by farmers.

1. The commentator has interpreted the causes in the context of present knowledge base.
2. na = Information not available or inability to interpret.

recommended by Surapala possess biocidal properties. Some plant species were used for other properties such as stickiness. I found the use of lotus mud most fascinating; i.e., to ensure long residual action of the prescribed materials. Modern humans will raise eyebrows when they would think of applying milk to trees, but we must remember that almost every farmer, as in remote villages of South Asia even today, kept cows and/or buffaloes. If there was no market for these products nearby, the farmer must have had more milk than the family needed. Such a surplus could have easily been spared for trees. The same case must have been true for ghee (clarified butter). I am unable to comprehend the use of some materials such as cow horn, tiger flesh, elephant milk, and horse hair. Likewise it is difficult for me to accept the remedy prescribed in verse 159 to prevent hail shower (see Table 2).

- Among the botanicals used, I find one of them, *vidanga*, suggested frequently. We do not seem to know much about its biocidal properties. Here is an opportunity for our scientists to look at this plant closely and critically.

- Where the scholars of those time failed to offer any practical remedy, they seem to have resorted to prayers, as we do today. For example, in verses 160–164 we see evidence of prayer to ward off damage due to rats, and other difficult pests.

- I found some recommendations enigmatic. For example in verse 63, Surapala suggested no planting for a year or two after growing sesame or black gram. On the other hand, Varahamihira (500 AD) in his Brhatsamhita mentioned that when a piece of land was brought under a crop, sesame should be planted, chopped down, and incorporated into soil before seed was produced. I had conjectured, based on reports from India and Nigeria, that incorporation of sesame would reduce biomass of the obnoxious weed, *Cyperus rotundus*, and also sesame is a good trap crop for *Striga*. Therefore, Varahamihira had good reasons to recommend sesame for a new/fallow field.

Table 2. A tabular compilation of materials recommended in Vrikshayurveda for managing various plant disorders and information on the chemical constituents of these materials in the context of present knowledge base.

Materials recommended	Verse number(s)	Constituents/properties reported[1]	Additional information
Hog fat	186	Fatty acids on decomposition.	Carcasses must have been easily available.
Porpoise oil	186	Fatty acids on decomposition.	Caracasses must have been easily available.
Ghee (clarified butter)	186, 192, 196, 198, 200–201, 203, 210	Fatty acids on decomposition.	In old times every farmer normally had ghee in excess of his needs.
Hemp (sunn hemp?)	186	na[2]	na
Horse hair	186	na	na
Cow/buffalo horn	186, 195	na	na
Panchamula (roots of five plant species) - *Clerodendrum phlomoides*	187	Molluscicidal; antifungal; antiviral; antifeedant; antibacterial.	Molluscicidal and antifungal triterpenoid saponin from the roots; antiviral activity in leaf extracts; insect growth-inhibitive and antifeedant properties due to neoclerodane diterpenes, etc. from leaves; antibacterial properties in leaf extracts.
- *Aegle marmelos*		Antifungal (*Sclerotinia sclerotiorum*); antifeedant for insects; nematicidal (*Meloidogyne* spp.)	Antimicrobial and anthelmintic properties in seed; leaf powder effective against *Meloidogyne*; decomposed leaves antifungal (*Sclerotinia sclerotiorum*); leaf extracts reduced rice tungro by interfering with leafhopper feeding.
- *Stereospermum suaveolens*		Antifungal; antibacterial.	Bark contains crystalline substance having antifungal and antibacterial properties.
- *Gmelina arborea*		na	Bark and roots contain alkaloids; resinous substances present.
- *Oroxylum indicum*		Antiseptic properties.	Bark contains alkaloids, tannic acid, and a glucoside called tetuine.
White mustard (*Sinapis alba* = *Brassica alba*)	52, 53, 188, 194, 195, 196, 198	Insect antixenosis and antibiosis; acaricidal; nematicidal; antifungal.	Sinalbin responsible for anti-insect properties; mustard meal attracts natural enemies of *Brassica* root flies; acaricidal in mixture with powdered garlic; glucosinolates found nematicidal (against *Heterodera schachtii*); fungicidal activity due to allyl isothiocyanate.

continued

Table 2. *continued*

Materials recommended	Verse number(s)	Constituents / properties reported[1]	Additional information
Sesame (*tila*)	53, 55, 188, 196, 198, 206, 207, 215, 216–217	Allelopathic to rice; insect-repellent; insecticidal.	Allelopathy studies were carried out using extracts of sesame parts; repellent to stored rice pest (*Sitophilus oryzae*); oil used in insecticide formulations; mucilaginous juice of plant is used to destroy head lice; presence of antioxidants in oil preserve it longer.
Ash	188, 197	na	Probably served as "sterile" powder as well as a source of minerals.
Milk (cow / buffalo)	52, 54, 55, 191, 194, 198, 199, 200–201, 203, 204, 207, 208, 209, 212, 213, 214, 218	Virus inhibitor; excellent sticker / spreader; good for saprophytic bacteria.	Casein of milk gives spreader-sticker properties. Saprophytic bacteria can promote antibiosis against pathogens.
Honey	54, 191, 192, 200–201, 203, 210, 213, 219	Mildly antimicrobial.	na
Yastimadhu (licorice)	191	Antimicrobial; antimutagenic activity; allows colonization of vesicular-arbuscular endomycorrhizae; antifungal and antibacterial.	Antifungal and antimicrobial activity due to saponin; saponins are in inner bark; principal constituent (glycyrrhizin) present in underground parts.
Madhuka (*mahua*) (Indian butter tree)	191	Insecticidal oil; piscicidal; antibacterial.	Reduces survival of rice green leafhopper and thus reduces tungro incidence; oil cake has saponin (mowrin). Cake also possesses insecticidal and piscicidal properties. Flowers have antibacterial properties.
Fruits of *triphala* (*Terminalia chebula*, *T. bellirica*, and *Phyllanthus emblica*)	192	The three fruits together have anthelmintic properties.	Dried flesh surrounding the seed is rich in tannin (30%).
Cold water	193	Removes insects from roots and branches.	Irrigation of trees for 7 days
Kunapa water (liquid manure)	101, 102, 103, 104, 105, 106, 194, 199, 205, 214	Nourishing.	Already an "ancient" practice during Surapala's time.
Cow dung	53, 54, 194, 210	Mucous present in the dung provides "cementing" effect in a paste.	na

continued

Table 2. *continued*

Materials recommended	Verse number(s)	Constituents/properties reported[1]	Additional information
Vaca (*Zingiber zerumbet*)	194, 195	Antibacterial.	The oil containing monocyclic sesquiterpene ketone called zerumbone shows antibacterial properties.
Kusta (costus)	194	Insecticidal (repellents, antifeedant); antiseptic.	Reported effective against red cotton bug and stored grain pest (*Tribolium castaneum*). Costus oil is an excellent sticker, used for protecting shawls and woolen fabrics from insects.
Ativisa (*Aconitum* sp.)	194	High phenolic content; insecticidal and rodenticidal.	Grows in Himalayan region; known to inhibit germination of other plant species, e.g., rice.
Ramatha (asafoetida)	195	Biocidal properties (antifungal; antimicrobial).	Inhibition of mycelial growth and sclerotium formation in two soilborne fungi—*Rhizoctonia solani* and *Sclerotinia sclerotiorum* reported; contains resin (40–60%), gum (25%), and volatile oil (10–17%).
Vidanga (*bidanga*) (*Embelia ribes*)	52, 54, 195, 196, 198, 212, 219	Anthelmintic; antibacterial; insecticidal.	Aqueous extracts of fruits have antibacterial activity; crushed seeds of *Embelia schimperi* are eaten by Masai people (in Tanzania and Kenya) to eliminate intestinal tapeworms; embelin (benzoquinone) obtained from *vidanga* is effective against stored grain pests.
Usana (black pepper)	195	Bacteriostatic; fungistatic; insecticidal.	Oleoresin, present in black pepper, shows bacteriostatic and fungistatic properties and retards rancidity due to the presence of tocopherols; alkaloid (piperin) gives the pungency and shows more insecticidal property than pyrethrums.
Pigeon flesh	195	na	na
Bhillata (*bhallataka*) (*Semecarpus anacardium*)	195	Insecticidal; antiseptic; termite-repellent; mildew- and moth-proofing of cloth; anthelmintic; antibacterial.	Rich source of phenols; kernel oil used for preserving wood against termites; leaves contain saponins; fruits have anthelmintic property; juice of pericarp is antibacterial.
Beef	195, 196, 216–217	na	Manurial effect (?).
Brick-dust	197	na	Interference with insect feeding (?).
Cow's urine	198	na	na
Plaksa (*Ficus lacor*) and *udumbara* (*F. glomerata*)	200–201, 210	na	Some *Ficus spp.* are known to possess antibacterial activity; bark of *F. glomerata* contains 14% tannin; latex of *F. lacor* is anthelmintic.

continued

Table 2. *continued*

Materials recommended	Verse number(s)	Constituents / properties reported[1]	Additional information
Wine	200–201	Properties of alcohol — disinfectant.	na
Crab shells	204, 209	na	Used for making smoke (fumigation).
Lotus	55, 205, 207	Anthelmintic; bacteriostatic; antifungal; stickiness in rhizosphere mud.	Alkaloids present in leaves, carpels, and rhizomes; rhizomes of lotus showed antifungal activity against *Aspergillus niger*, *Trichoderma viride*, and *Penicillium* spp.; stickiness due to a high viscosity exopolysaccharide, comparable to xanthan, produced by *Azotobacter vinelandii* present in the rhizosphere of the rhizomes of lotus.
Vidari (Indian kudzu)	206	Antifungal.	Antifungal properties reported from tubers.
Sugar	206, 207	na	na
Nagajivha (red arsenic)	206	Biocide.	Used to revive trees struck by lightning.
Nyagrodha (*Ficus benghalensis*)	210	Latex with good sealing property; tannin.	Possibly to ensure sticking of pastes for long periods, when applied over wounds.
Dhava (*Anogeissus latifolia*)	211	Produces gum and contains tannins and glycosides.	A timber tree often used in making bullock carts, plows, etc.; bark contains 12–18% tannins and is bitter and astringent; gum is dessicant.
Sriparnika (*Myrica esculenta*)	211	Bark contains tannins, glycosides; antiseptic; piscicidal; fruits produce wax.	Lotion from bark is used for washing putrid sores; piscicidal properties used by people of Khasi hills in eastern India.
Syama (*Ichnocarpus fruitescens*)	211	na	The bark of the creeper yields a good fibre; roots have medicinal properties.
Vetasa (*Salix caprea*)	211	Flavonoids in wood; tannins in bark; glycosides present; antibacterial.	Flavonoids are reported to be inhibitors of wood-destroying fungi; tannin 8–13% in the bark; callus in tissue culture showed antibacterial properties.
Arjuna (*Terminalia arjuna*)	211	Bark reported to be antidysenteric; twigs used to cure mouth ulcers; fruits contain tannin.	May have antimicrobial properties.
Barley / wheat	213, 215, 216–217	na	Powder (flour) recommended for use. Could there be release of their products after slow hybrolysis? Or could it be used as spreader / sticker?

continued

Table 2. *continued*

Materials recommended	Verse number(s)	Constituents/properties reported[1]	Additional information
Kulattha (*Macrotyloma uniflorum* = *Dolichos biflorus*), black gram (*Vigna mungo*), and green gram (*V. radiata*)	215	na	Powder (flour) recommended for use. Could there be release of their products after slow hydrolysis? Or could it be used as spreader/sticker?
Goat/sheep dung	216–217	na	na
Tiger/leopard/fox flesh and elephant milk	218	na	Seems like an impractical task for any farmer even in those times.
Bones of cow and dog mixed with excreta of cat	220	na	Burning these materials together to smoke cucurbits to "cure" various diseases. Fumigating effect cannot be explained unless tested.
Brhati (*Solanum indicum*)	53, 55	na	na
Jaggery	57	na	Known to possess sticking property.

1. Information on chemical constituents obtained from the Wealth of India (CSIR, India) and world literature search (1986–95). Readers should feel free to contact the commentator if they wish to know specific references.
2. na = Information not available or inability to interpret.

- Lastly, a verse, not related to plant protection, caught my attention because the contents of the verse reveal the ground truth for human civilization. Verse 44 states that if wealth, destiny, and king were favorable, any tree could grow anywhere with special effort. If we interpret wealth as resources, destiny as luck, and king as government and its policies, we should be able to produce enough food for the increasing population!

Plant Index

Figures indicate verse numbers in the section "The Science of Plant Life" in the English translation of Surapala's Vrikshayurveda. Authors of scientific names of three plant species (*asmapa, asvakarna,* and *birbhati*) are not available.

abhaya (*haritaki*) (*Terminalia chebula* Retz., chebulic myrobalan; *T. citrina* Roxb. ex Flem.) 254–258

alambu(ka) (*Cucurbita maxima* Duch., squash, pumpkin, red gourd) 69, 155, 156

alukanda (*Dioscorea* sp.) 51

amalaka(ki) (*Phyllanthus emblica* Linn., syn. *Emblica officinalis* Gaertn., emblic myrobalan, Indian gooseberry) 23, 299 (also see *dhatri*)

amra (*Mangifera indica* Linn., mango) 16, 23, 43, 48–49, 87, 123, 232, 241, 323 (also see *makanda*—mango)

amrata (*amralata*) (*Spondias pinnata* (Linn. f.) Kurz, wild mango) 41, 132, 259–260

anjana (translated by some as *Terminalia arjuna* (Roxb.) Wight & Arn.; collyrium, black pigment, extract of *Amomum xanthioides* Wall. ex Baker, wild Siamese cardamon) 241, 299

ankola (see *ankolha*)

ankolha (*Alangium lamarckii* Thw., syn. *A. salviifolium* (Linn. f.) Wang.) 123, 143, 246, 277, 278, 281, 291–292

ardra(ka) (*Zingiber officinale* Rosc., ginger) 51

arjuna (*Terminalia arjuna* (Roxb.) Wight & Arn., arjun) 30, 116, 211, 273, 276, 277, 323 (also see *nara*)

asana (*Terminalia alata* Heyne ex Roth, laurel) 244

ash gourd (see *kusmanda*)

asita (*Indigofera tinctoria* Linn., indigo) 315 (also see *nili*)

asmapa (*Coleus scutellarioides*) 254–258 (see notes)

asoka (*Saraca asoca* (Roxb.) De Wilde, ashoka) 42, 92, 149, 233

asphota (*Clitoria ternatea* Linn.) 254–258

asvaghna (*Zanthoxylum limonella* (Dennst.) Alston) 236

asvakarna (*Vatica robusta*) 322

asvattha (*Ficus religiosa* Linn., peepal, sacred fig) 11, 23, 26, 320 (also see *pippala*)

atimukta(ka) (*Hiptage benghalensis* (Linn.) Kurz, clustered hiptage) 43, 254–258, 293 (also see *madhavi*)

ativisa (*Aconitum heterophyllum* Wall. ex Royle, atis root) 194

badari (*badara*) (*Ziziphus mauritiana* Lam., Indian jujube, common jujube) 29, 48–49, 93, 135, 308, 309 (also see *kola* and *sauvira*)

bakula (*Mimusops elengi* Linn., bulletwood) 56, 87, 147, 245, 250 (also see *kesara*)

bamboo (see *vamsa*)

banyan (see *vata*)

barley (see *yava*)

betel nut (*Areca catechu* Linn., areca nut) 124 (also see *puga*)

bhallataka (*Semecarpus anacardium* Linn. f., marking nut tree) 91, 195, 323

bhillata (see *bhallataka*)

bhillota (see *bhallataka*)

bibhitaka (*Terminalia bellirica* Roxb., belliric myrobalan) 312

bidanga (*Embelia ribes* Burm. f.) 52, 54, 83, 100, 116, 119, 125, 142, 229, 237, 254–258 (also see *vidanga*)

bijapuraka (*Citrus limon* (Linn.) Burm. f., lemon) 29, 43, 141

bilva (*Aegle marmelos* Correa ex Roxb., bael, Bengal quince) 10, 23, 48–49, 134, 137, 142 (also see *sriphala*)

birbhati (*Cirbhata cucumus*) 155

black gram (*Vigna mungo* (Linn.) Hepper) 63, 104, 125, 126, 139, 142, 215, 253, 254–258, 321

breadfruit (*Artocarpus altilis* (Parkinson) Fosb.) 127

brhati (*Solanum indicum* Linn., poison berry) 53, 55, 236

brinjal (see *vartaka*)

camphor (*Cinnamomum camphora* (Linn.) Nees & Eberm.) 143

cane 302

cardamom (see *ela*)

castor (see *eranda*)

champa(ka) (*Michelia champaca* Linn., champak, golden champa) 38, 43, 48–49, 245

cincini (*Tamarindus indica* Linn., tamarind) 23, 48–49, 253

coconut (see *narikela*)

cotton (*Gossypium* spp.) 154, 239, 274

cucumber (see *trapusa* and *urvaru*)

cumin (*Cuminum cyminum* Linn.) 230–231

dadima (*dadimba*) (*Punica granatum* Linn., pomegranate) 43, 69, 79–80, 280, 283 (also see *dadimi*)

dadimi (*Punica granatum* Linn., pomegranate) 20, 29, 50, 87, 128, 129, 130, 131, 132, 246, 266 (also see *dadima*)

damanaka (*Artemisia vulgaris* Linn., mugwort) 71

darada (vermilion; *Solanum melongena* Linn., eggplant, brinjal) 240 (also see *vartaka*)

date (see *kharjura*)

dhanyaka (*Coriandrum sativum* Linn., coriander) 88

dhataki (*Woodfordia fruticosa* Kurz, fire-flame bush) 259–260

dhatri (*Phyllanthus emblica* Linn., syn. *Emblica officinalis* Gaertn., emblic myrobalan, Indian gooseberry) 12, 93, 135, 254–258 (also see *amalaka*)

dhava (*dhaura*) (*Anogeissus latifolia* Wall. ex Bedd., ghatti, button tree) 211

ela (*sthula—Amomum subulatum* Roxb., Nepal cardamom; *suksma—Elettaria cardamomum* Maton, cardamom) 51, 146

eranda (*Ricinus communis* Linn., castor) 30, 247

gale (*Myrica* sp.) 277, 278, 279, 281, 289, 291–292

ganikarika (*Premna serratifolia* Linn., syn. *P. integrifolia* Linn.; *Clerodendrum phlomoides* Linn. f.) 187

golla (*gola* ?) (*Meyna laxiflora* Robyns) 88

gourd (see *kusmanda* and *patola*)

grape (see *mrdvi*)

grass (plant of the family Gramineae) 60, 115

green gram (*Vigna radiata* (Linn.) Wilczek, mung bean) 215, 321

haridra (*nisa, rajani*) (*Curcuma longa* Linn., turmeric) 32, 116, 142, 239, 242, 243, 244, 253

hastikarna (name of various plants—*Ricinus communis* Linn. (castor), *Butea monosperma* (Lam.) Kuntze (bastard teak), *Arum* sp.) 322

hemp (*Cannabis sativa* Linn., hemp; *Crotalaria juncea* Linn., sunn hemp) 186

hingu (*Ferula assa-foetida* Linn., asafoetida) 275 (also see *ramatha*)

indigo (see *nili*)

jackfruit (see *panasa*)

jalada (*Cyperus rotundus* Linn., nut grass) 248 (also see *musta*)

jalini (*Luffa acutangula* (Linn.) Roxb., ridge gourd) 143 (also see *rajakosa*)

jambeera (*Premna herbacea* Roxb.; it could be *Citrus limon* (Linn.) Burm. f., lemon) 41

jambu (*Syzygium cuminii* (Linn.) Skeels, black plum, Java plum) 21, 41, 48–49, 56, 135, 232, 304, 321

jantu (*Ficus glomerata* Roxb., country fig, cluster fig) 145 (also see *udumbara*)

jasmine (*Jasminum multiflorum* (Burm. f.) Andr., downy jasmine; *J. officinale* Linn., common jasmine) 38, 259–260 (also see *kunda*)

jira (see cumin)

kadali (*Musa paradisiaca* Linn., banana, plantain) 29, 41, 74–75, 82, 89, 117, 138, 160, 246, 270, 271, 272, 275, 297, 322 (also see *rambha*)

kadamba (*Anthocephalus cadamba* Miq.) 41, 144

kakaraka (*Momordica charantia* Linn., bitter gourd) 89 (also see *karavella* and *karkaru*)

kalaaya (*durva*) (a kind of plant with dark colored flowers; *durva—Cynodon dactylon* (Linn.) Pers., Bermuda grass) 245

kalaya (pulse, edible seeds of leguminous crops) 143

kamala (*Citrus reticulata* Blanco, mandarin orange) 127

kancanara (*Bauhinia variegata* Linn.) 30 (also see *kovidara*)

kapittha (*Limonia acidissima* Linn., syn. *Feronia limonia* (Linn.) Swingle, wood apple) 23, 48–49, 93, 137, 254–258, 324

karamarda(ka) (*Carissa carandas* Linn., caranda) 48–49, 93

karanja (*Pongamia pinnata* Pierre, Indian beech) 30

karavella (*Momordica charantia* Linn., bitter gourd) 247 (also see *kakaraka* and *karkaru*)

karavira (*Nerium indicum* Mill., Indian oleander) 50, 79–80, 152, 251, 252, 266, 289

karikesaraka (*Mesua ferrea* Linn., ironwood tree, cobra's saffron) 144 (also see *nagakesara*)

kari(ra) (*Capparis decidua* Edgew.) 42

karkandhu(ka) (*Ziziphus oenoplia* Mill., jackal jujube) 42, 135

karkaru (*Momordica charantia* Linn., bitter gourd) 155 (also see *kakaraka* and *karavella*)

kasa (*Saccharum spontaneum* Linn.) 138, 318

kasisa (green sulphate of iron; *Moringa oleifera* Lam., drumstick tree; *kasis—Cornus macrophylla* Wall.) 244

kastha (*Curcuma xanthorrhiza* Roxb.) 310

kataka (*Strychnos potatorum* Linn., clearing nut tree) 124, 299

kesara (*Mimusops elengi* Linn., bulletwood) 42 (also see *bakula*)

ketaki (*Pandanus odoratissimus* Linn. f., screw pine) 41, 146, 147

khadira (*Acacia catechu* Willd., catechu) 323

kharjura(ri) (*Phoenix sylvestris* Roxb., date) 41, 124, 127

khus (*Vetiveria zizanioides* (Linn.) Nash, vetiver) 145, 232, 299

kimsuka (*Butea monosperma* (Lam.) Kuntze, bastard teak) 239, 242, 276 (also see *palasa*)

kola (*Ziziphus mauritiana* Lam., Indian jujube, common jujube) 134 (also see *badari* and *sauvira*)

kosataka (*mahakosataki* ?) (*Luffa aegyptiaca* Mill. ex Hook) 299

kovidara (*Bauhinia variegata* Linn.) 315 (also see *kancanara*)

ksirika (*Manilkara hexandra* (Roxb.) Dubard) 56, 87, 144 (also see *ksirindika* and *ksirini*)

ksirindika (could be *ksirika—Manilkara hexandra* (Roxb.) Dubard) 144 (also see *ksirika* and *ksirini*)

ksirini (*Manilkara hexandra* (Roxb.) Dubard) 20, 31 (also see *ksirika* and *ksirindika*)

kulattha (a kind of pulse; *Macrotyloma uniflorum* (Lam.) Verdcourt, syn. *Dolichos biflorus* Linn., horse gram) 215, 276

kumbhakari (*guggulu*) (*Commiphora mukul* (Hook. ex Stocks) Engl., Indian bdellium) 48–49

kumkuma (*Crocus sativus* Linn., saffron) 51, 71, 314

kumuda (*Nymphaea alba* Linn., white water lily) 292

kunda (*Jasminum multiflorum* (Burm. f.) Andr., downy jasmine) 50 (also see jasmine)

kurabaka (*Barleria prionitis* Linn.) 150 (also see *kuranta*)

kuranta (*karunta*) (*Barleria prionitis* Linn.) 152 (also see *kurabaka*)

kusa (*Desmostachya bipinnata* (Linn.) Stapf) 315, 318

kusmanda (*Benincasa hispida* (Thunb.) Cogn., ash gourd, white gourd) 69, 234, 275, 285–286, 287–288

kusta (*Saussurea lappa* C.B. Clarke, costus) 194, 243, 250

lakuca (*Artocarpus lakoocha* Roxb.) 41, 87, 135

langali (*Gloriosa superba* Linn., superb lily) 236

lodhra (*Symplocos racemosa* Roxb.) 135, 239, 244

lotus 1, 38, 55, 83, 149, 150, 205, 207, 235, 265, 290, 295, 311, 316 (also see *kumuda*, *padma*, and *utpala*)

madhavi (*Hiptage benghalensis* (Linn.) Kurz, clustered hiptage) 152, 259–260 (also see *atimukta*)

madhuka (*Madhuca indica* J.F. Gmel., Indian butter tree) 19, 48–49, 143, 191, 235, 238, 321

madhukarkata (*Citrus maxima* (Burm.) Merrill, pummelo) 282

makanda (*manakanda*) (*Alocasia indica* (Roxb.) Schott) 56, 69, 148

makanda (*Mangifera indica* Linn., mango) 227 (also see *amra*)

malli(ka) (*Jasminum sambac* (Linn.) Ait., Arabian jasmine) 50, 153

mango (see *amra* and *makanda*)

manjista (*Rubia cordifolia* Linn., Indian madder) 239, 240, 242

maruwaka (*Origanum majorana* Linn., common marjoram) 71, 73 (also see *phanijjhaka*)

matulungi (*Citrus medica* Linn., citron) 140

mrdvi(ka) (*draksa*) (*Vitis vinifera* Linn., grape) 41, 122, 238

mulaka (*Raphanus sativus* Linn., radish) 88, 284

munj (*Saccharum bengalense* Retz.) 318

mura (*Erythrina stricta* Roxb.) 248, 249

musta (*Cyperus rotundus* Linn., nut grass) 145, 249, 299 (also see *jalada*)

mustard (*Brassica nigra* Koch, black mustard) 52, 53, 55, 142, 198

naga (sometimes used instead of *nagajihva*—*Hemidesmus indicus* R. Br., Indian sarsaparilla) 250, 299, 324

nagakesara (*Mesua ferrea* Linn., ironwood tree, cobra's saffron) 48–49 (also see *karikesaraka*)

nara (*arjuna*) (*Terminalia arjuna* (Roxb.) Wight & Arn., arjun) 277 (also see *arjuna*)

naranga (*narangika*) (*Citrus sinensis* (Linn.) Osbeck, sweet orange) 72, 141, 142

narikela (*Cocos nucifera* Linn., coconut) 41, 124, 125, 126, 274, 277, 278, 279, 281, 283, 289, 291–292

nata (*Valeriana wallichii* DC.) 248, 249 (also see *tagara*)

neem (see *nimba* and *picumanda*)

nicula (*Barringtonia acutangula* Gaertn.) 118, 324

nili (*Indigofera tinctoria* Linn., indigo) 32, 241, 243, 244, (also see *asita*)

nimba (*Azadirachta indica* A. Juss., margosa tree, neem) 14, 42, 92, 139, 274 (also see *picumanda*)

nirgundi (*Scirpus grossus* Linn. f.) 306

nyagrodha (*Ficus benghalensis* Linn., banyan) 23, 24, 26, 210, 320 (also see *vata*)

orange (see *naranga*)

padma (*Nelumbo nucifera* Gaertn., sacred lotus) 51, 290

palasa (*Butea monosperma* (Lam.) Kuntze, bastard teak) 17, 309 (also see *kimsuka*)

palasini (probably same as *palasin* (*prasannar*); a species of tree (*ksiravrksa*)) 254–258

palm (tree or shrub of the family Palmae) 124, 323

panasa (*Artocarpus heterophyllus* Lam., jackfruit) 20, 41, 48–49, 56, 133

paravata (*Cicca acida* (Linn.) Merr., country gooseberry) 93, 139

patala (*Stereospermum suaveolens* DC.) 50, 153, 187, 322

patola(ka) (*Trichosanthes dioica* Roxb., pointed gourd) 89, 157, 234

patraka (*Cinnamomum tamala* Nees & Eberm., Indian cassia) 248 (also see *tamala*)

payasya (name used for several plants; *Gynandropsis gynandra* (Linn.) Briq.) 273

pea (*Pisum sativum* Linn.) 135

phalini (*Callicarpa macrophylla* Vahl) 92 (also see *priyangu*)

phanijjhaka (*Origanum majorana* Linn., common marjoram) 73, 88 (also see *maruwaka*)

picumanda (*Azadirachta indica* A. Juss., margosa tree, neem) 23, 287–288, 324 (also see *nimba*)

pippala (*Ficus religiosa* Linn., peepal, sacred fig) 24 (also see *asvattha*)

plaksa (*Ficus lacor* Buch.-Ham.) 15, 25, 26, 50, 200–201

plantain (see *kadali*)

pointed gourd (see *patola*)

pomegranate (see *dadima* and *dadimi*)

priyala (*Buchanania lanzan* Spreng.) 20

priyangu (*Callicarpa macrophylla* Vahl) 43, 48–49 (also see *phalini*)

puga (*Areca catechu* Linn., areca nut, betel nut) 65 (also see betel nut)

pumpkin (see alambu)

punnaga (*Calophyllum inophyllum* Linn., Alexandrian laurel) 43, 48–49, 92, 250

rajakosa (*rajakoshataki*) (*Luffa acutangula* (Linn.) Roxb., ridge gourd) 87 (also see *jalini*)

ramatha (*Ferula assa-foetida* Linn., *asafoetida*) 195 (also see *hingu*)

rambha (*Musa paradisiaca* Linn., banana, plantain) 20 (also see *kadali*)

rasona (*Allium sativum* Linn., garlic) 51

rice (*Oryza sativa* Linn.) 74–75, 135, 139, 140, 156, 159, 200–201, 274, 320 (also see *sastika*)

saffron (see *kumkuma*)

saka (*Tectona grandis* Linn. f., teak) 42

salmali (*Bombax malabaricum* DC., silkcotton tree) 243

sami (*Prosopis cineraria* Druce) 42, 323

saptachhada (*Alstonia scholaris* R. Br.) 154 (also see *saptaparna*)

saptaparna (*Alstonia scholaris* R. Br.) 42, 321 (also see *saptachhada*)

sarvatobhadra (*Gmelina arborea* Roxb.) 187

sastika (rice variety that matures in 60 days) 74–75, 320 (also see rice)

satapatrika (*Rosa centifolia* Linn., cabbage rose) 77, 88

sauvira (*Zizyphus mauritiana* Lam., Indian jujube, common jujube) 144 (also see *badari* and *kola*)

sephali(ka) (*Vitex negundo* Linn., east Indian walnut) 42, 154 (also see *sinduvara*)

sesame (see *tila*)

simsapa (*Dalbergia sissoo* Roxb., sissoo) 254–258

sinduvara (*Vitex negundo* Linn., east Indian walnut) 48–49 (also see *sephalika*)

sirisa (*Albizia lebbek* Benth.) 92, 321

slesmata(ka) (*Cordia wallichii* G. Don) 30, 279, 291–292

sobhanjana (*Moringa oleifera* Lam., drumstick tree) 42

sriparnika (*Myrica esculenta* Buch.-Ham., syn. *M. nagi*, box myrtle) 211

sriphala (*Aegle marmelos* Correa ex Roxb., bael, Bengal quince) 42, 187 (also see *bilva*)

sugarcane (*Saccharum officinarum* Linn.) 229, 230–231

suryavalli (*suryaparni* ?) (*Teramnus labialis* Spreng.) 254–258

syama (*Ichnocarpus frutescens* R. Br.) 144, 151, 211

syonaka (*Oroxylum indicum* Vent.) 187

tagara (*Valeriana wallichii* DC.) 48–49 (also see *nata*)

tamala (*Cinnamomum tamala* Nees & Eberm., Indian cassia) 74–75 (also see *patraka*)

tamarind (see *cincini*)

tambuli (*Piper betle* Linn., betel) 48–49

tala (*Borassus flabellifer* Linn., palmyra palm) 41

tarquari (*Clerodendrum phlomoides* Linn. f.) 273, 276

tila(ka) (*Sesamum indicum* Linn., sesame) 41, 53, 55, 63, 100, 104, 107, 124, 125, 134, 135, 140, 142, 144, 150, 154, 188, 196, 198, 206, 207, 215, 216–217, 242, 244, 253, 254–258, 259–260, 321

tinduka (*Diospyros tomentosa* Roxb., ebony persimmon; *D. peregrina* (Gaertn.) Gurke, gaub persimmon) 139, 320

tinisa (*Ougeinia dalbergioides* Benth., sandan) 41

trapusa (*Cucumis sativus* Linn., common cucumber) 70, 155, 220, 285–286 (also see *urvaru*)

triphala (the three kinds of myrobalan—*Terminalia chebula* Retz. (chebulic myrobalan), *T. bellirica* Roxb. (belliric myrobalan), and *Phyllanthus emblica* Linn., syn. *Emblica officinalis* Gaetrn. (emblic myrobalan, Indian gooseberry)) 130, 133, 192, 241, 243, 244, 253, 283 (also see *vara*)

tulasi (*Ocimum sanctum* Linn., sacred basil) 9

turmeric (see *haridra*)

tuta (*Morus alba* Linn., white mulberry) 87

udumbara (*Ficus glomerata* Roxb., country fig, cluster fig) 18, 24, 26, 50, 200–201, 210, 310 (also see *jantu*)

urvaru (*Cucumis sativus* Linn., common cucumber) 57, 275 (also see *trapusa*)

usana (*Piper nigrum* Linn., black pepper) 195

utpala (*Nymphaea stellata* Willd., Indian blue water lily, blue lotus) 51, 289, 290, 295

vaca (*Zingiber zerumbet* Rosc. ex Smith) 194, 195, 254–258

valaka (*Marsilea minuta* Linn.) 248

vamsa (*Bambusa arundinacea* (Retz.) Willd., bamboo) 41, 93

vara (the three kinds of myrobalan—*Terminalia chebula* Retz. (chebulic myrobalan), *T. bellirica* Roxb. (belliric myrobalan), and *Phyllanthus emblica* Linn., syn. *Emblica officinalis* Gaetrn. (emblic myrobalan, Indian gooseberry)) 244 (also see *triphala*)

varahi (*Dioscorea bulbifera* Linn., potato yam) 230–231

vartaka (*Solanum melongena* Linn., egg plant, brinjal) 88, 234, 287–288 (also see *darada*)

vata (*Ficus benghalensis* Linn., banyan) 13, 41, 50 (also see *nyagrodha*)

vetasa (*Salix caprea* Linn., goat willow) 211, 254–258

vidanga (*Embelia ribes* Burm. f.) 195, 196, 198, 212, 219 (also see *bidanga*)

vidari (*Pueraria tuberosa* DC., Indian kudzu) 206

wheat (*Tritricum aestivum* Linn.) 213, 321

white mustard (*Synapis alba* Linn., syn. *Brassica alba* Boiss.) 116, 117, 127, 188, 194, 195, 196

yasti (*Glycyrrhiza glabra* Linn., licorice) 235, 237, 238, 244 (also see *yastimadhuka*)

yastimadhu(ka) (*Glycyrrhiza glabra* Linn., licorice) 134, 191 (also see *yasti*)

yava (*Hordeum vulgare* Linn., barley) 126, 127, 135, 213, 215, 216–217, 237, 238, 241, 242, 253, 254–258, 259–260, 320, 321

yuthi (*Jasminum auriculatum* Vahl) 154

New Delhi
CSIR-TKDL

Asian Agri-History Foundation
47 ICRISAT Colony-I, Brig. Sayeed Road
Secunderabad 500 009, Andhra Pradesh, India

ISSN 0971-7722

Order Code: AHB 001